TOSHIBA

SERVICE MANUAL

MULTIFUNCTIONAL DIGITAL COLOR SYSTEMS

e-STUDIO3511/4511

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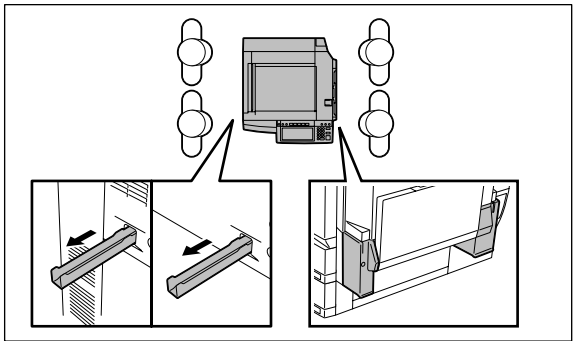
GENERAL PRECAUTIONS REGARDING THE INSTALLATION AND SERVICE FOR e-STUDIO3511/4511

The installation and service should be done by a qualified service technician.

1. **Transportation/Installation**
   - When transporting/installing the equipment, employ four persons and be sure to use the positions as indicated below.
     The equipment is quite heavy and weighs approximately 112kg (246 lb.), therefore pay full attention when handling it.



   - Be sure not to hold the movable parts or units (e.g. the control panel, ADU or RADF) when transporting the equipment.
   - Be sure to use a dedicated outlet with AC 110/13.2A, 115V or 127V/12A, 220V-240V or 240V/8A) for its power source.
   - The equipment must be grounded for safety.
     Never ground it to a gas pipe or a water pipe.
   - Select a suitable place for installation.
     Avoid excessive heat, high humidity, dust, vibration and direct sunlight.
   - Also provide proper ventilation as the equipment emits a slight amount of ozone.
   - To insure adequate working space for the copying operation, keep a minimum clearance of 80 cm (32") on the left, 80 cm (32") on the right and 10 cm (4") in the rear.
   - The socket-outlet shall be installed near the equipment and shall be easily accessible.

2. **Service of Machines**
   - Basically, be sure to turn the main switch off and unplug the power cord during service.
   - Be sure not to touch high-temperature sections such as the exposure lamp, the fuser unit, the damp heater and their periphery.
   - Be sure not to touch high-voltage sections such as the chargers, transfer belt, 2nd transfer roller, developer, IH control circuit, high-voltage transformer, exposure lamp control inverter, inverter for the LCD backlight and power supply unit. Especially, the board of these components should not be touched since the electric charge may remain in the capacitors, etc. on them even after the power is turned OFF.
   - Be sure not to touch rotating/operating sections such as gears, belts, pulleys, fan, etc.
   - Be careful when removing the covers since there might be the parts with very sharp edges underneath.
   - When servicing the machines with the main switch turned on, be sure not to touch live sections and rotating/operating sections. Avoid exposure to laser radiation.
   - Use suitable measuring instruments and tools.
   - Avoid exposure to laser radiation during servicing.
     - Avoid direct exposure to the beam.
     - Do not insert tools, parts, etc. that are reflective into the path of the laser beam.
     - Remove all watches, rings, bracelets, etc. that are reflective.
   - Unplug the power cable and clean the area around the prongs of the plug once a year or more. A fire may occur when dust lies on this area.

3. **Main Service Parts for Safety**
   - The breaker, door switch, fuse, thermostat, thermofuse, thermistor, etc. are particularly important for safety. Be sure to handle/install them properly. If these parts are shorted circuit and/or made their functions out, they may burn down, for instance, and may result in fatal accidents. Do not allow a short circuit to occur. Do not use the parts not recommended by Toshiba TEC Corporation.

4. **Cautionary Labels**
   - During servicing, be sure to check the rating plate and the cautionary labels such as “Unplug the power cord during service”, “Hot area”, “Laser warning label” etc. to see if there is any dirt on their surface and whether they are properly stuck to the equipment.

5. **Disposition of Consumable Parts, Packing Materials, Used batteries and RAM-ICs**
   - Regarding the recovery and disposal of the equipment, supplies, consumable parts, packing materials, used batteries and RAM-ICs including lithium batteries, follow the relevant local regulations or rules.

6. **When parts are disassembled, reassembly is basically the reverse of disassembly unless otherwise noted in this manual or other related documents. Be careful not to reassemble small parts such as screws, washers, pins, E-rings, star washers in the wrong places.**

7. **Basically, the machine should not be operated with any parts removed or disassembled.**

8. **Precautions Against Static Electricity**
   - The PC board must be stored in an anti-electrostatic bag and handled carefully using a wristband, because the ICs on it may become damaged due to static electricity.

   Caution: Before using the wristband, pull out the power cord plug of the equipment and make sure that there are no uninsulated charged objects in the vicinity.

Caution :	Dispose of used batteries and RAM-ICs including lithium batteries according to this manual.
Attention :	Se débarrasser de batteries et RAM-ICs usés y compris les batteries en lithium selon ce manuel.
Vorsicht :	Entsorgung des gebrauchten Batterien und RAM-ICs (inklusive der Lithium-Batterie) nach diesem Handbuch.

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1. SPECIFICATIONS/ACCESSORIES/OPTIONS/SUPPLIES

1.1 Specifications

Values in [ ] are for e-STUDIO4511 in case that the specification is different between e-STUDIO3511 and e-STUDIO4511.

- Copy process: Indirect electrophotographic process (dry)
- Type: Desktop type (Console type: when optional Paper Feed Pedestal (PFP) or optional Large Capacity Feeder (LCF) is installed.)
- Original table: Fixed type (the left rear corner used as guide to place originals)
- Accepted originals: Sheet, book and 3-dimentional object
  For single-sided originals – 50-127 g/m^2 (13-34 lb. Bond)
  For double-sided originals – 50-105 g/m^2 (13-28 lb. Bond)
  None of the carbon, bonded nor stapled sheet original is acceptable when using the optional Reversing Automatic Document Feeder.
  Maximum size: A3/LD
- Copy speed (Copies/min.)

e-STUDIO3511

Paper supply / Paper size	Drawer	Bypass feed (Size specified)	PFP	LCF
A4, LT, B5	35 (11)	35 (11)	35 (11)	35 (11)
A4-R, B5-R, A5-R, LT-R, ST-R	28 (5)	28 (5)	28 (5)	–
B4, LG	24 (5)	24 (5)	24 (5)	–
A3, LD	21 (5)	21 (5)	21 (5)	–

e-STUDIO4511

Paper supply / Paper size	Drawer	Bypass feed (Size specified)	PFP	LCF
A4, LT, B5	45 (11)	45 (11)	45 (11)	45 (11)
A4-R, B5-R, A5-R, LT-R, ST-R	32 (5)	32 (5)	32 (5)	–
B4, LG	26 (5)	26 (5)	26 (5)	–
A3, LD	22 (5)	22 (5)	22 (5)	–

* "–" means "Not acceptable".
* The copy speed in the above table are available when originals are manually placed for single side, continuous copying.
* When the Reversing Automatic Document Feeder is used, the copy speed of 35[45] sheets per minute is only available under the following conditions:
  - Original/Mode: Single-sided original/A4/LT size. APS/automatic density are not selected. /Plain paper.
  - Number of sheets: 35[45] or more at the black mode and 11 or more at the color mode.
  - Reproduction ratio: 100%
* The values in ( ) are available when printed at color mode.

* System copy speed

Copy mode		Sec.	
		e-STUDIO3511	e-STUDIO4511
Single-sided originals	1 set	22.9 (70.3)	19.8 (70.3)
↓	3 sets	60.9 (181.8)	49.9 (181.8)
Single-sided copies	5 sets	94.8 (292.2)	76.3 (292.2)
Single-sided originals	1 set	31.3 (95.1)	30.3 (95.1)
↓	3 sets	70.7 (201.8)	71.9 (201.8)
Double-sided copies	5 sets	110.1 (311.2)	101.5 (311.2)
Double-sided originals	1 set	59.6 (149.6)	59.5 (149.6)
↓	3 sets	138.7 (366.6)	130.4 (366.6)
Double-sided copies	5 sets	217.3 (584.6)	201.5 (584.6)
Double-sided originals	1 set	51.2 (124.6)	51.5 (124.6)
↓	3 sets	120.8 (346.5)	105.7 (346.5)
Single-sided copies	5 sets	188.7 (565.7)	158.5 (565.7)

- The system copy speed is available when 10 sheets of A4/LT size original are set on the RADF and one of the copy modes in the above table is selected.
- The period of time from pressing [START] to displaying "READY" is the actually measured value.
- Setting: Automatic exposure OFF, APS/AMS OFF, Text/Photo Mode, feeding from the upper drawer and Sort Mode.
- The finisher with the saddle stitcher and hole punch unit are not installed.
- The values in ( ) are the speeds at the color modes.

• Copy paper

	Drawer	ADU	PFP	LCF	Bypass copy	Remarks
Size	A3 to A5-R LD to ST-R, 13" LG, 8.5" SQ			A4, LT	A3 to A6-R, LD to ST-R, 13" LG, 8.5"SQ, 305 x 457 mm (12" x 18") (Non-standard or user-specified sizes can be set.)	
Weight	64 to 105 g/m^2 17 to 28 lb. Bond				64 to 209 g/m^2,17 lb. Bond to 110 lb. Index (Continuous feeding) 64 to 209 g/m^2, 17 lb. Bond to 110 lb. Index (Single paper feeding)	
Special paper	-				Labels, OHP film (thickness: 80µm or thicker)	Special paper recommended by Toshiba Tec

• First copy time ..... Approx. 6.8 sec. or less (black), approx. 16.2 sec. or less (color)
(A4/LT, upper drawer, 100%, original placed manually)

• Warming-up time ..... Approx. 40 seconds (Stand-alone, temperature: 20°C)

• Multiple copying ..... Up to 999 copies; Key in set numbers

- Reproduction ratio ..... Actual ratio: 100±0.5%
  Zooming: 25 - 400% in increments of 1%
  (25 - 200% when using RADF)
- Resolution/Gradation ..... Read: 600 dpi
  Write: Equivalent to 2400 dpi x 600 dpi (black copy)
  Equivalent to 600 dpi x 600 dpi (color copy)
- Eliminated portion ..... Leading edge : 3.0±2.0 mm, Side/trailing edges: 2.0±2.0 mm (black copy)
  Leading edge : 5.0±2.0 mm, Side/trailing edges: 2.0±2.0 mm (color copy)
  Leading/trailing edges: 5.0±2.0 mm, Side edges: 5.0±2.0 mm (black/color print)
- Paper feeding ..... Drawers in the equipment – 2 drawers (stack height 60.5 mm, equivalent to 550 sheets; 64-80 g/m^2 (17-22 lb. Bond))
  PFP – Option (1 or 2 drawers: stack height 60.5 mm, equivalent to 550 sheets; 64-80 g/m^2 (17-22 lb. Bond))
  LCF – Option (stack height 137.5 mm x 2, equivalent to 2500 sheets; 64-80 g/m^2 (17-22 lb. Bond))
  Bypass feed – Stack height 11 mm, equivalent to 100 sheets; 64-80 g/m^2 (17-22 lb. Bond)
- Capacity of originals in the Reversing Automatic Document Feeder (Option)
  ..... A3 to A5-R, LD to ST-R: 100 sheets/80 g/m^2 (Stack height 16mm or less)
- Automatic duplexing unit ... Stackless/switchback type
- Toner supply ..... Automatic toner density detection/supply
  Toner cartridge replacing method
- Density control ..... Automatic density mode and manual density mode selectable in 11 steps
- Weight ..... Approx. 112 kg (246.9 lb.)
- Power requirements ..... AC 110V/13.2A, AC 115V or 127V/15A, 220–240V or 240V/8A (50/60 Hz)
  * The acceptable value of each voltage is ±10%.
- Power consumption ..... 1.5 kW or less (100V series), 1.7 kW or less (200V series)
  * The electric power is supplied to the reversing automatic document feeder, finisher, PFP and LCF through the equipment.
- Total counter ..... Electronical counter

• Dimensions of the equipment ..... See the figure below (W660 x D718 x H739 mm)

* When the tilt angle of the control panel is 45 degrees.

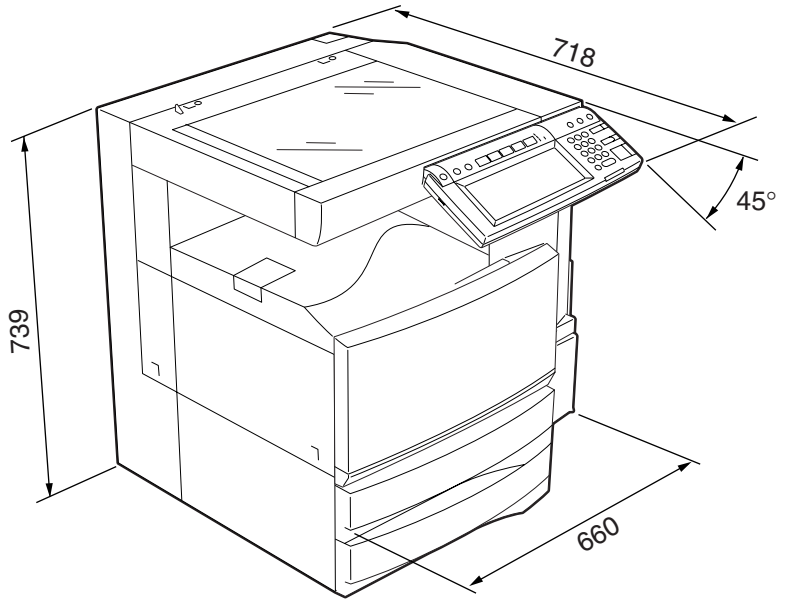


Fig. 1-101

1.2 Accessories

Unpacking/Setup instruction	1 set
Operator's manual	4 pcs. (except for MJD)
Operator's manual pocket	1 pc.
Power cable	1 pc.
Warranty sheet	1 pc. (for NAD)
Setup report	1 set (for NAD and MJD)
Customer satisfaction card	1 pc. (for MJD)
PM sticker	1 pc. (for MJD)
Drum (installed inside of the equipment)	1 pc.
Control panel stopper	1 pc.
Lever	1 pc.
Color developer holder	6 pcs.
Rubber plug	4 pcs.
Blind seal (small / large)	3 pcs. / 1pc.
CD-ROM	4 pcs.
Developer material (Y, M, C, K)	1 pc. each (for TWD)
Screw M3 x 8 / M4 x 8	1 pc. / 1pc.

* Machine version

NAD: North America
MJD: Europe
AUD: Australia
ASD: Asia
TWD: Taiwan
SAD: Saudi Arabia
JPD: Japan

1.3 Options

Platen cover	KA-3511PC
Reversing Automatic Document Feeder (RADF)	MR-3015
Drawer module	MY-1021
Paper Feed Pedestal (PFP)	KD-1011
Large Capacity Feeder (LCF)	KD-1012 A4/LT
Finisher (Hanging type)	MJ-1022
Finisher (Console type)	MJ-1023, MJ-1024 (with saddle stitcher)
Hole punch unit	MJ-6004 N/E/F/S
Staple cartridge	STAPLE-1600 (for hanging type) STAPLE-2000 (for console type) STAPLE-600 (for saddle stitcher)
Bridge kit	KN-3511
Key copy counter, key copy counter socket	MU-8, MU-10
Work table	KK-3511
Damp heater kit	MF-3511
FAX board	GD-1150
FAX board 2nd line	GD-1160
Expansion memory	GC-1180
Wireless LAN adapter	GN-1010
PCI slot	GO-1030
Scrambler board	GP-1030

Notes:

1. The bridge kit (KN-3511) is necessary for installation of the finisher (MJ-1022, MJ-1023 or MJ-1024).
2. The finisher (MJ-1023 or MJ-1024) is necessary for installation of the hole punch unit (MJ-6004N/E/F/S).
3. The PCI slot (GO-1030) is necessary for installation of the scrambler board (GP-1030).

1.4 Supplies

Drum	PS-OD3511
Toner bag	PS-TB3511
Toner cartridge (K)	PS-ZT3511 *K, PS-ZT3511K
Toner cartridge (Y)	PS-ZT3511 *Y, PS-ZT3511Y
Toner cartridge (M)	PS-ZT3511 *M, PS-ZT3511M
Toner cartridge (C)	PS-ZT3511 *C, PS-ZT3511C

Marked * : E, D, C and T

1.5 System List

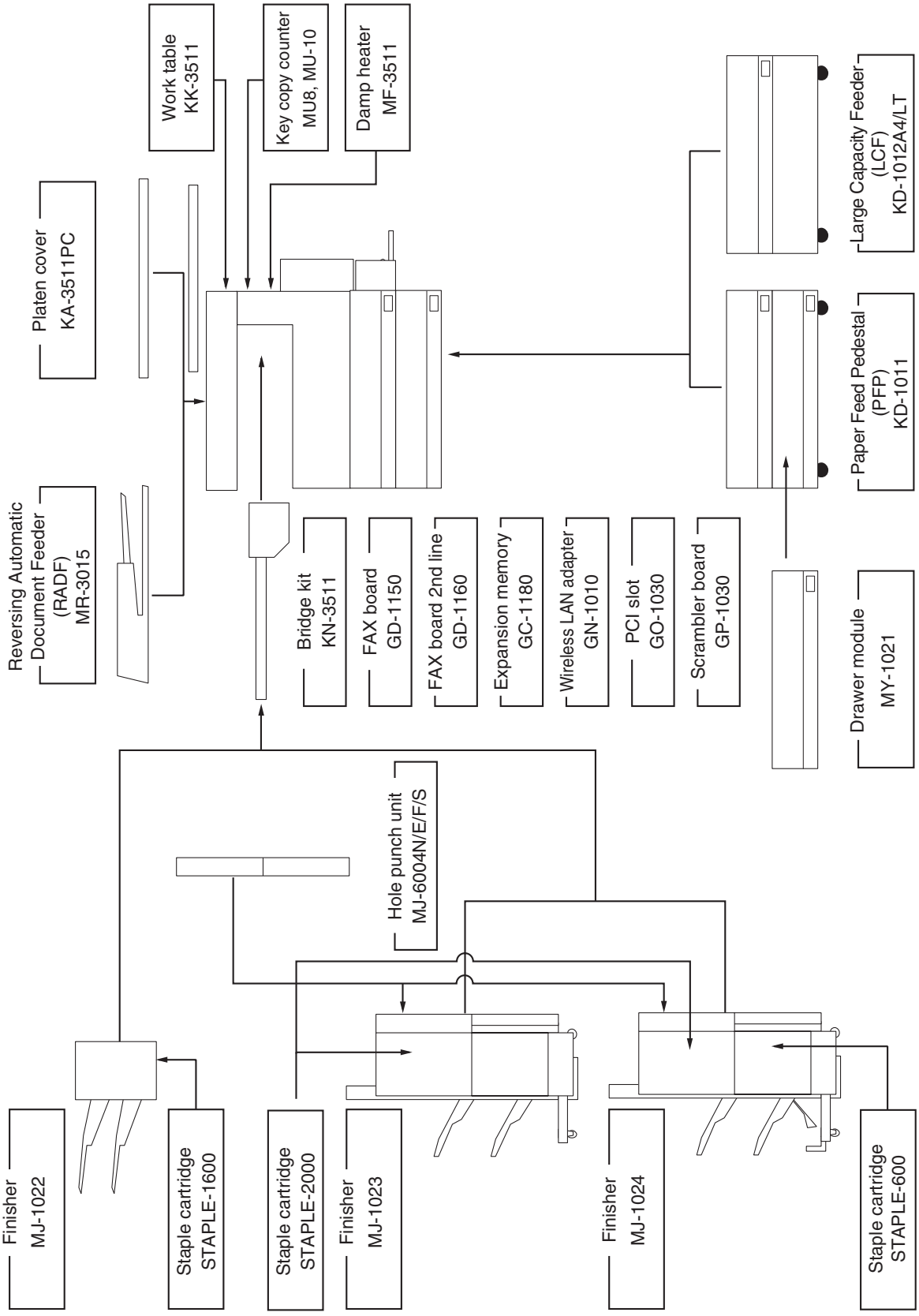


Fig. 1-501

2. OUTLINE OF THE MACHINE

2.1 Sectional View

[A] Front side view

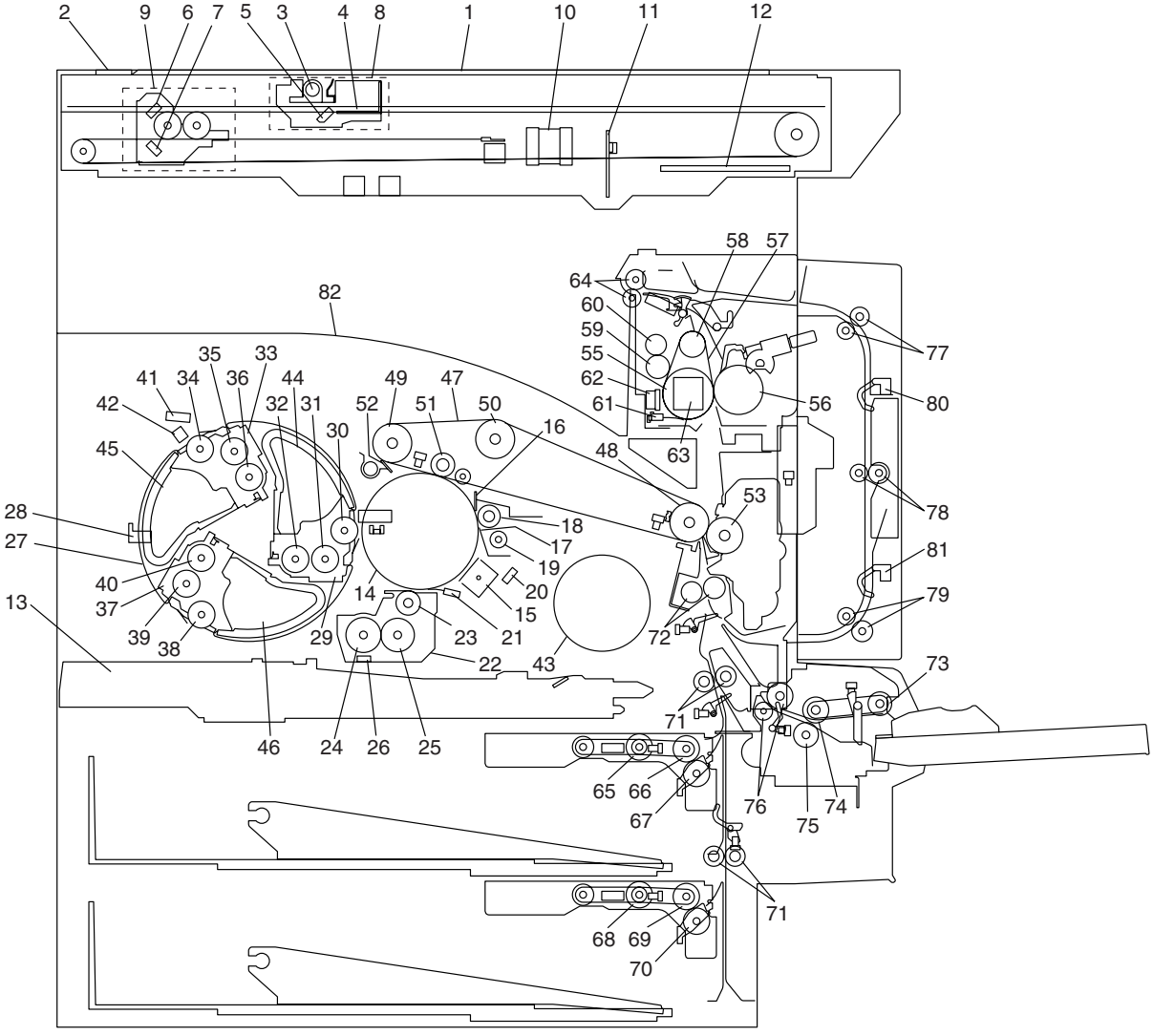


Fig. 2-101

1	Original glass
2	RADF original glass
3	Exposure lamp
4	Inverter board
5	Mirror-1
6	Mirror-2
7	Mirror-3
8	Carriage-1
9	Carriage-2
10	Lens
11	CCD board
12	SLG board
13	Laser unit
14	Photoconductive drum
15	Main charger
16	Recovery blade
17	Drum cleaning blade
18	Drum cleaner brush
19	Toner recovery auger
20	Discharge LED
21	Drum thermistor
22	Black developer unit
23	Developer sleeve K
24	Mixer-1 (K)
25	Mixer-2 (K)
26	Black auto-toner sensor
27	Revolver unit
28	Revolver home position sensor
29	Developer unit C
30	Developer sleeve C
31	Mixer-F (C)
32	Mixer-R (C)
33	Developer unit M
34	Developer sleeve M
35	Mixer-F (M)
36	Mixer-R (M)
37	Developer unit Y
38	Developer sleeve Y
39	Mixer-F (Y)
40	Mixer-R (Y)
41	Color auto-toner sensor

42	Color toner cartridge sensor
43	Black toner cartridge
44	Color toner cartridge C
45	Color toner cartridge M
46	Color toner cartridge Y
47	Transfer belt
48	Transfer belt drive roller-1
49	Transfer belt drive roller-2
50	Transfer belt tension roller
51	1st transfer roller
52	Transfer belt cleaning blade
53	2nd transfer roller
55	Fuser roller
56	Pressure roller
57	Fuser belt
58	Separation roller
59	Oil roller
60	Cleaning roller
61	Thermistor
62	Thermostat
63	Exit roller
64	IH coil
65	Upper drawer pickup roller
66	Upper drawer feed roller
67	Upper drawer separation roller
68	Lower drawer pickup roller
69	Lower drawer feed roller
70	Lower drawer separation roller
71	Transport roller
72	Registration roller
73	Bypass pickup roller
74	Bypass feed roller
75	Bypass separation roller
76	Bypass transport roller
77	ADU upper transport roller
78	ADU middle transport roller
79	ADU lower transport roller
80	ADU entrance sensor
81	ADU exit sensor
82	Receiving tray
83	Paper clinging detection sensor

[B] Rear side view (Drive system)

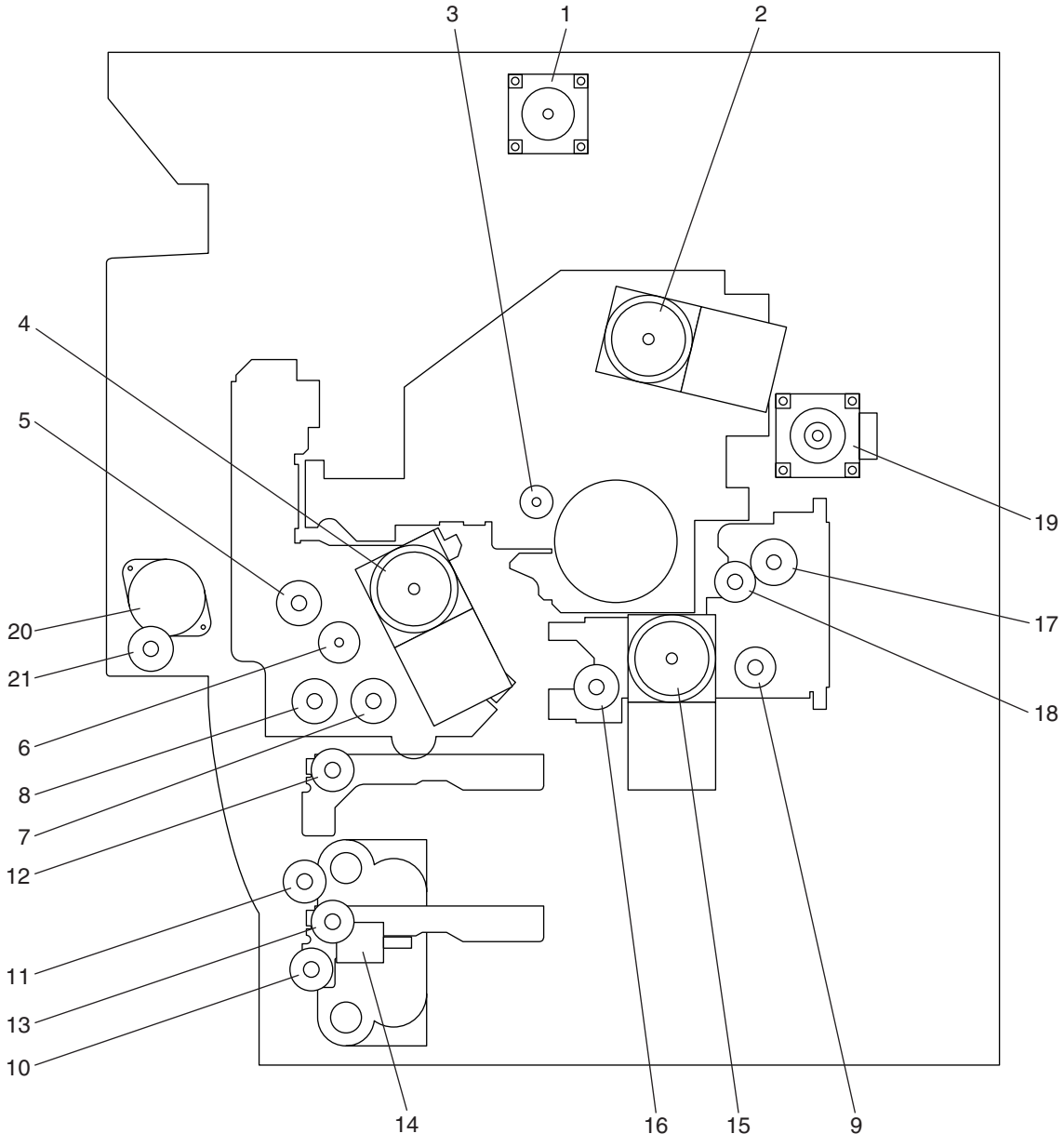


Fig. 2-102

1	Scan motor
2	Main motor
3	Drum cleaner brush motor
4	Transport motor
5	Registration clutch
6	Toner motor
7	Upper transport clutch (Low speed)
8	Upper transport clutch (High speed)
9	Black developer drive clutch
10	Lower transport clutch (High speed)
11	Lower transport clutch (Low speed)
12	Upper drawer feed clutch
13	Lower drawer feed clutch
14	Tray-up motor
15	Developer motor
16	Black developer lifting clutch
17	Color developer toner supply clutch
18	Color developer drive clutch
19	Revolver motor
20	ADU motor
21	ADU clutch

2.2 Electric Parts Layout

[A] Unit construction

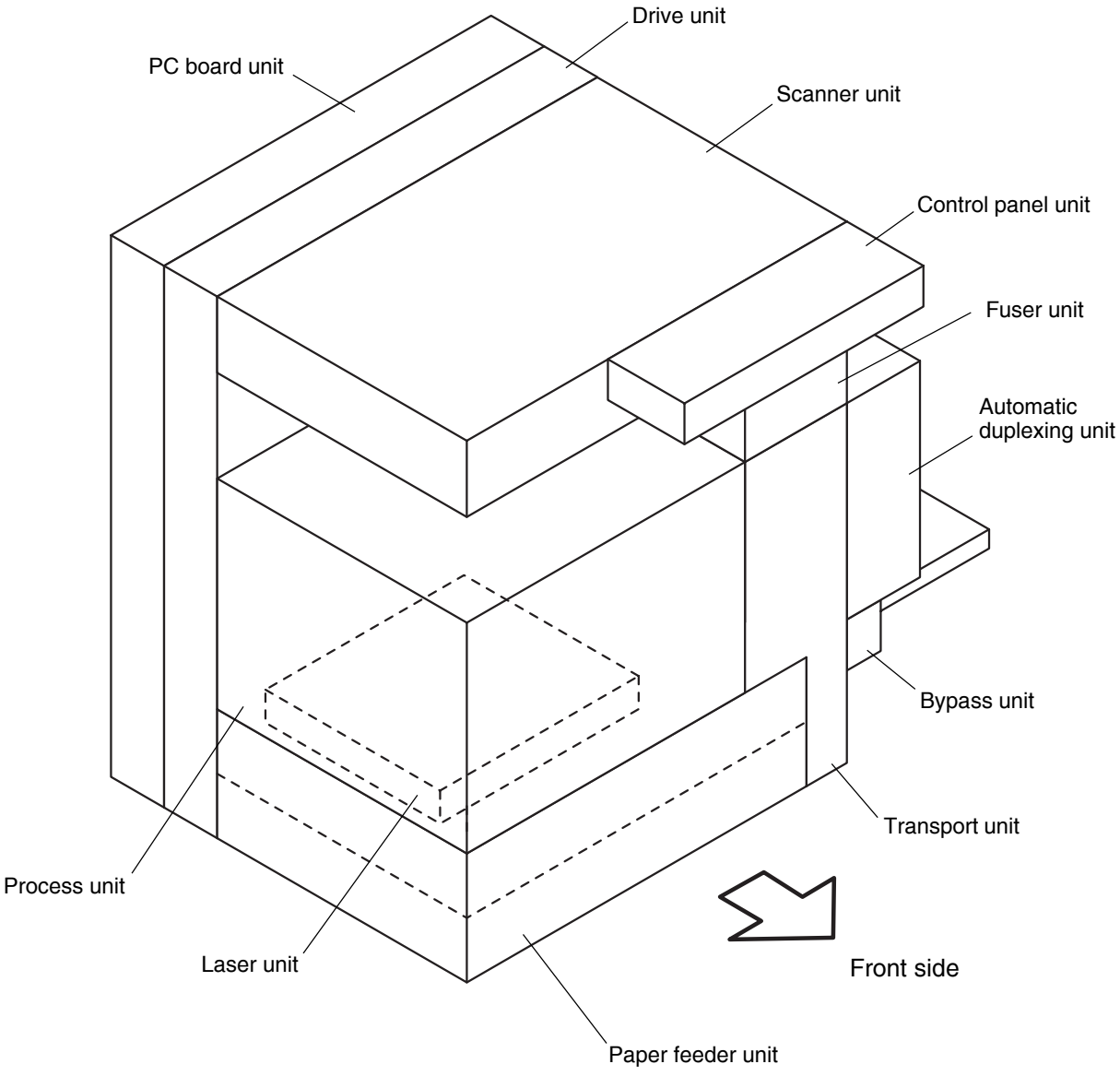


Fig. 2-201

[B] Scanner unit

(B-1) Motor, sensor, lamp

2

A4 series

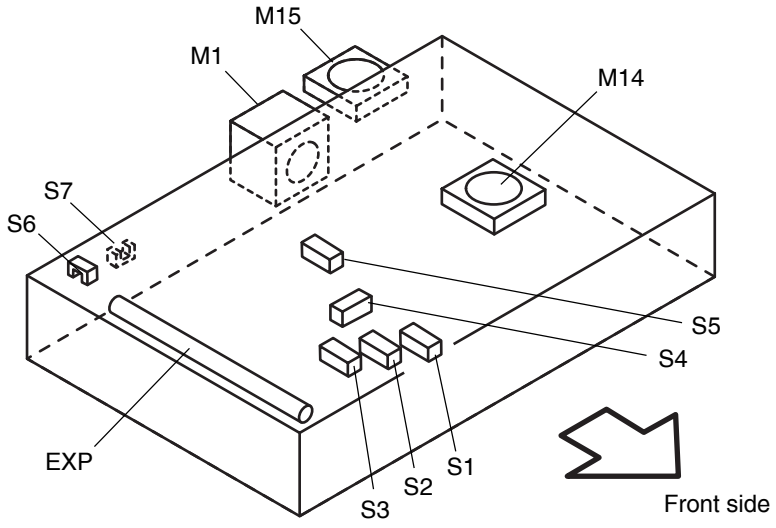


Fig. 2-202-1

LT series

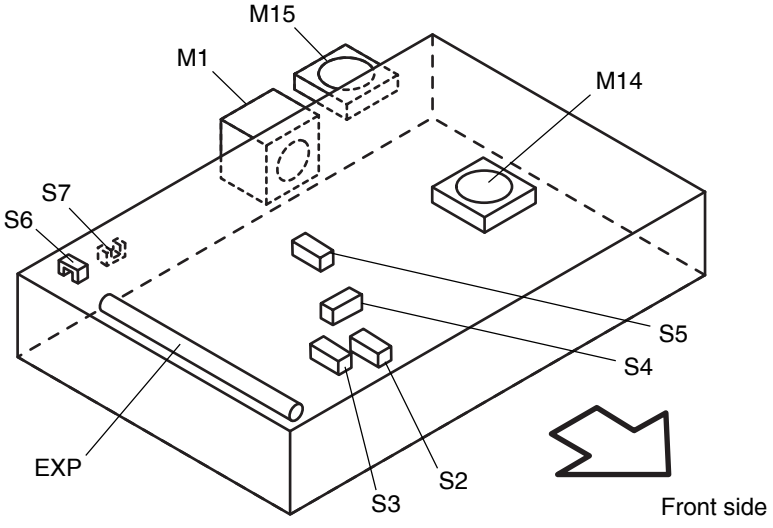
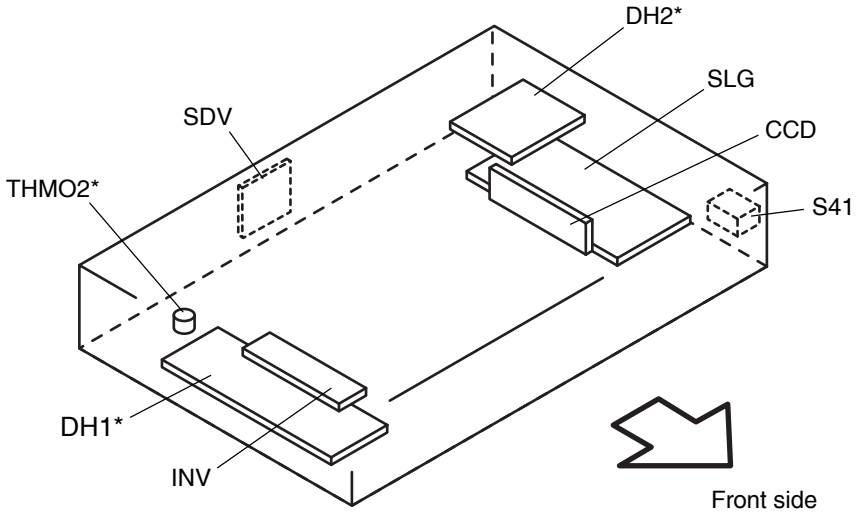


Fig. 2-202-2

(B-2) Switch, PC board, heater, thermostat, other part



* ASD/AUD/CND/SAD/TWD models: Standard,
NAD/MJD models: Option

Fig. 2-203

[C] Control panel unit

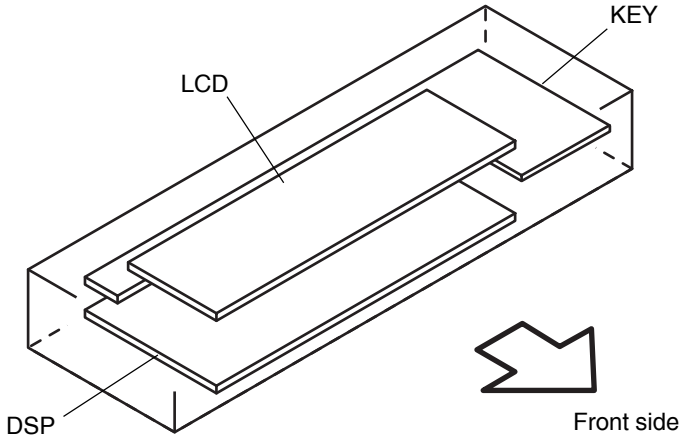


Fig. 2-204

[D] Process unit

(D-1) Motor, sensor, switch, clutch, solenoid

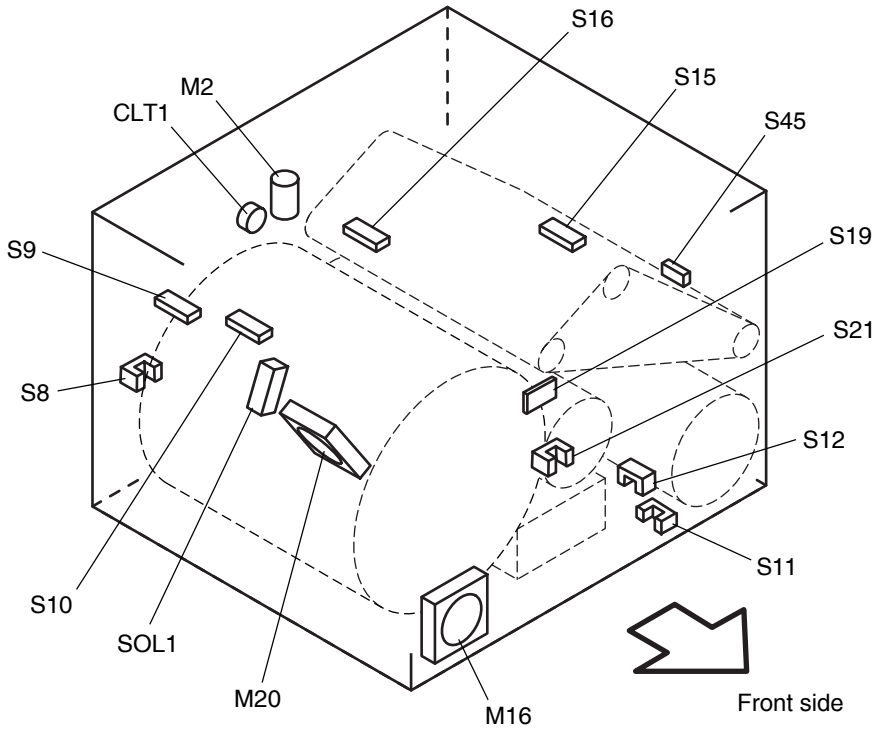
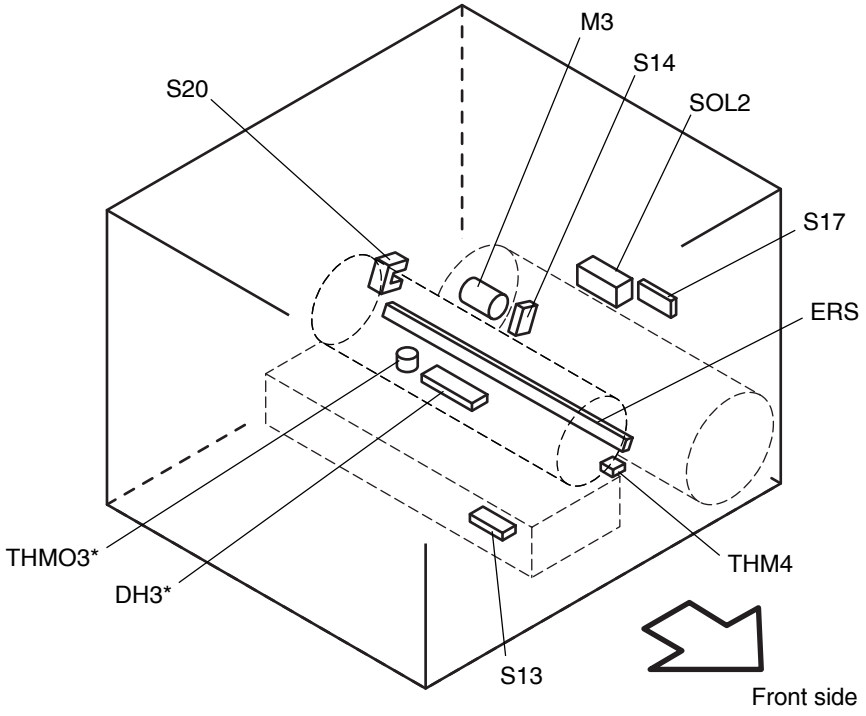


Fig. 2-205

(D-2) Motor, sensor, switch, solenoid, lamp, heater, thermistor, thermostat



* ASD/AUD/CND/SAD/TWD models: Standard,
NAD/MJD models: Option

Fig. 2-206

(D-3) Motor, switch

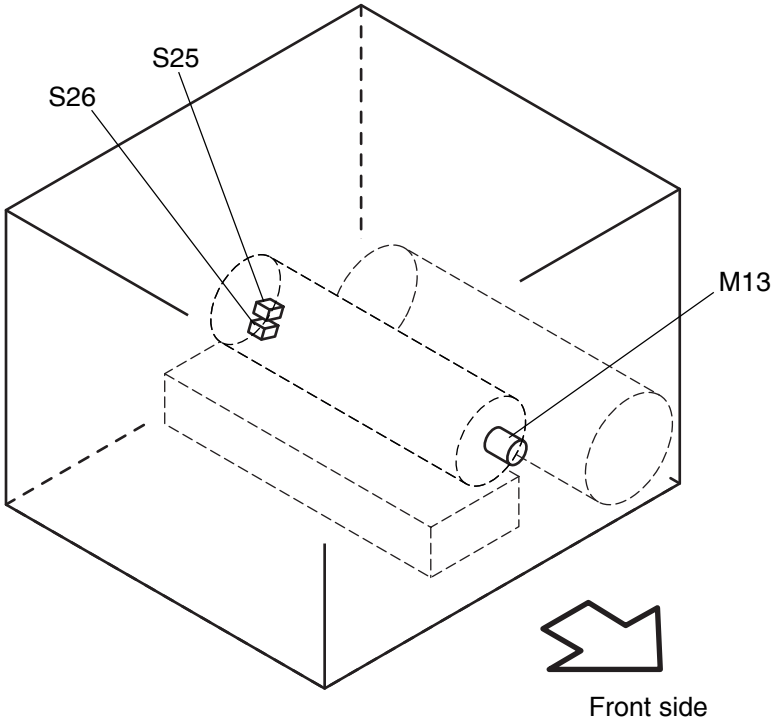


Fig. 2-207

[E] Laser unit

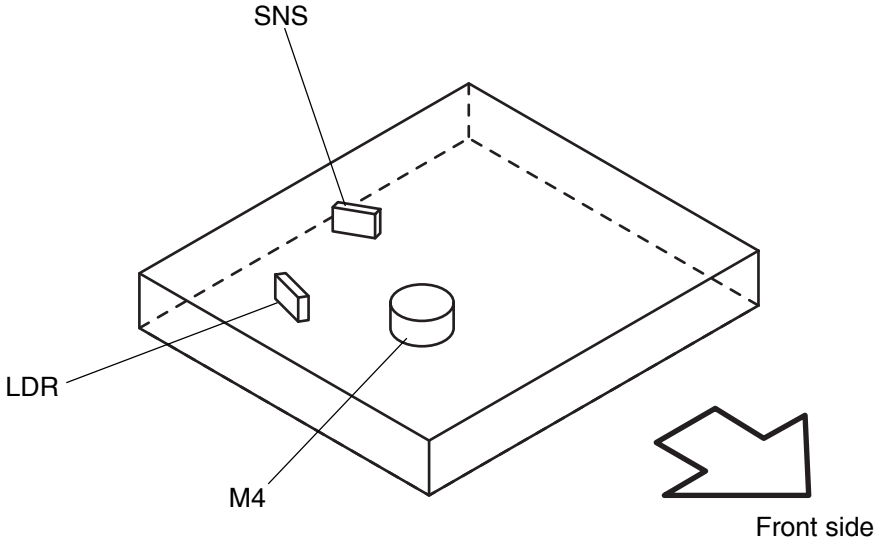


Fig. 2-208

[F] Paper feeder unit

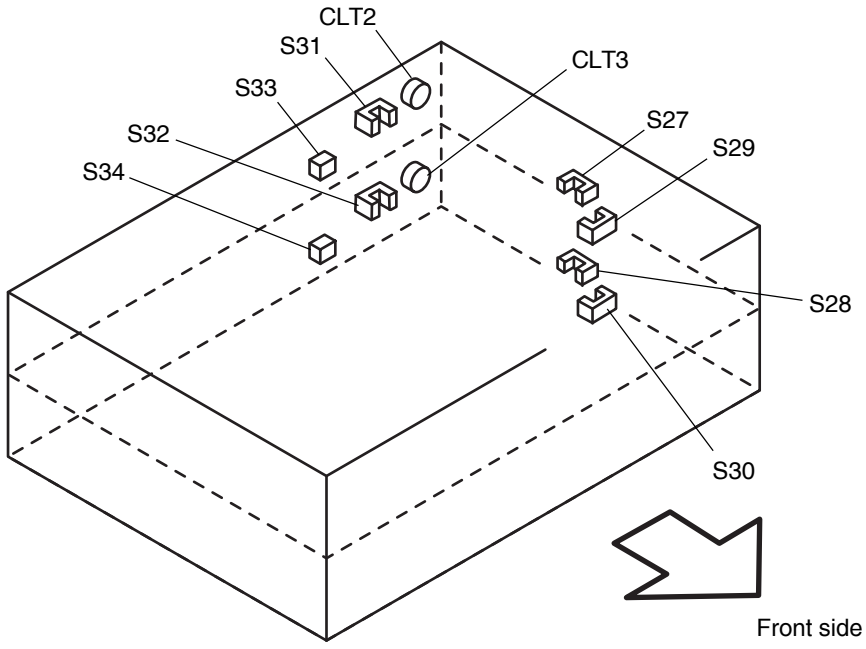


Fig. 2-209

[G] Transport unit

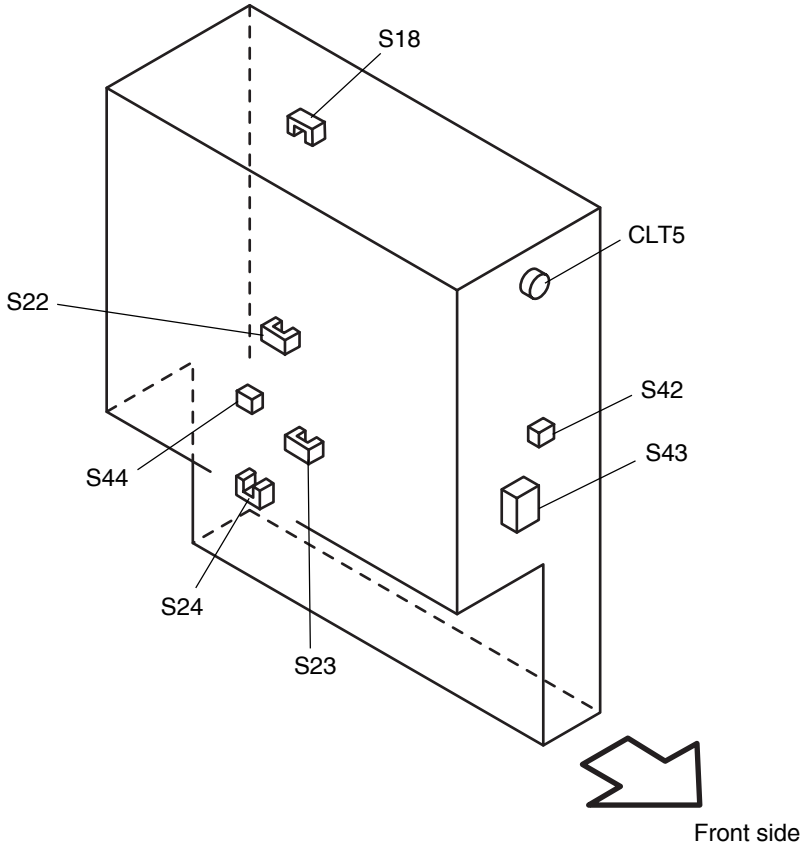


Fig. 2-210

[H] Bypass unit

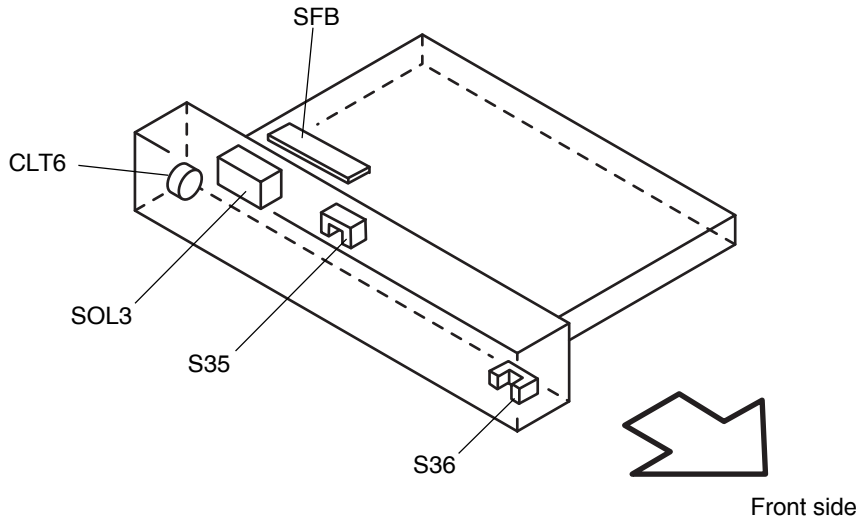


Fig. 2-211

[I] Automatic duplexing unit

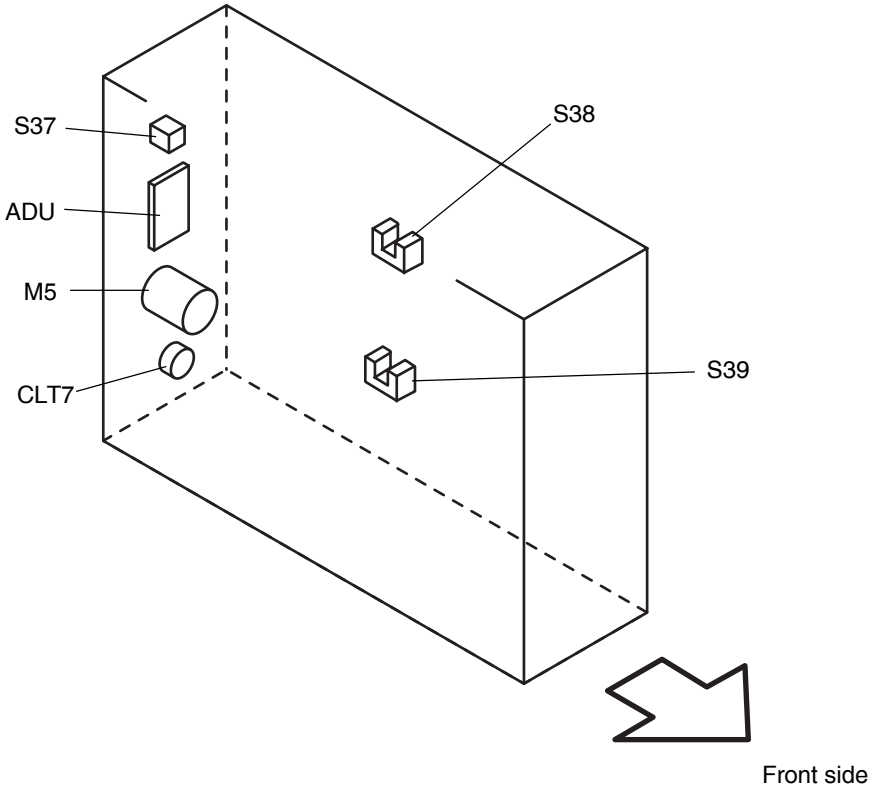


Fig. 2-212

[J] Fuser unit

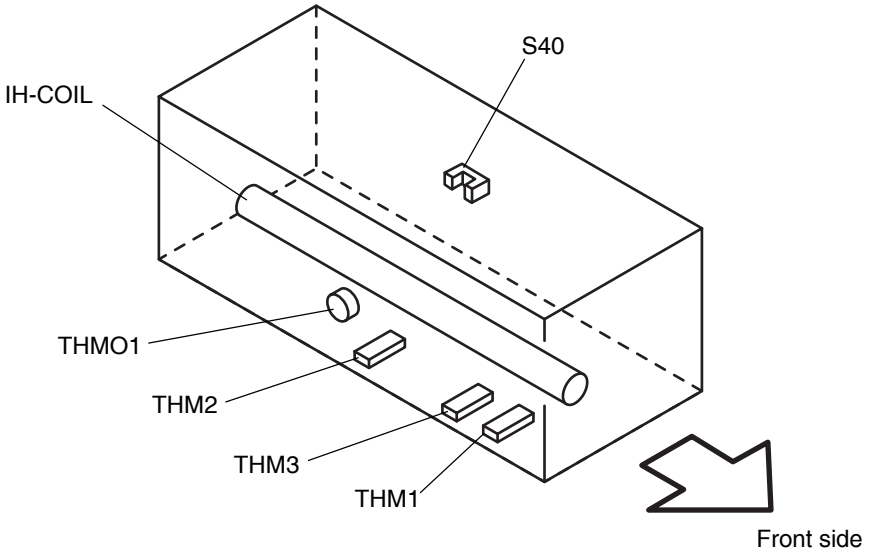


Fig. 2-213

[K] Drive unit

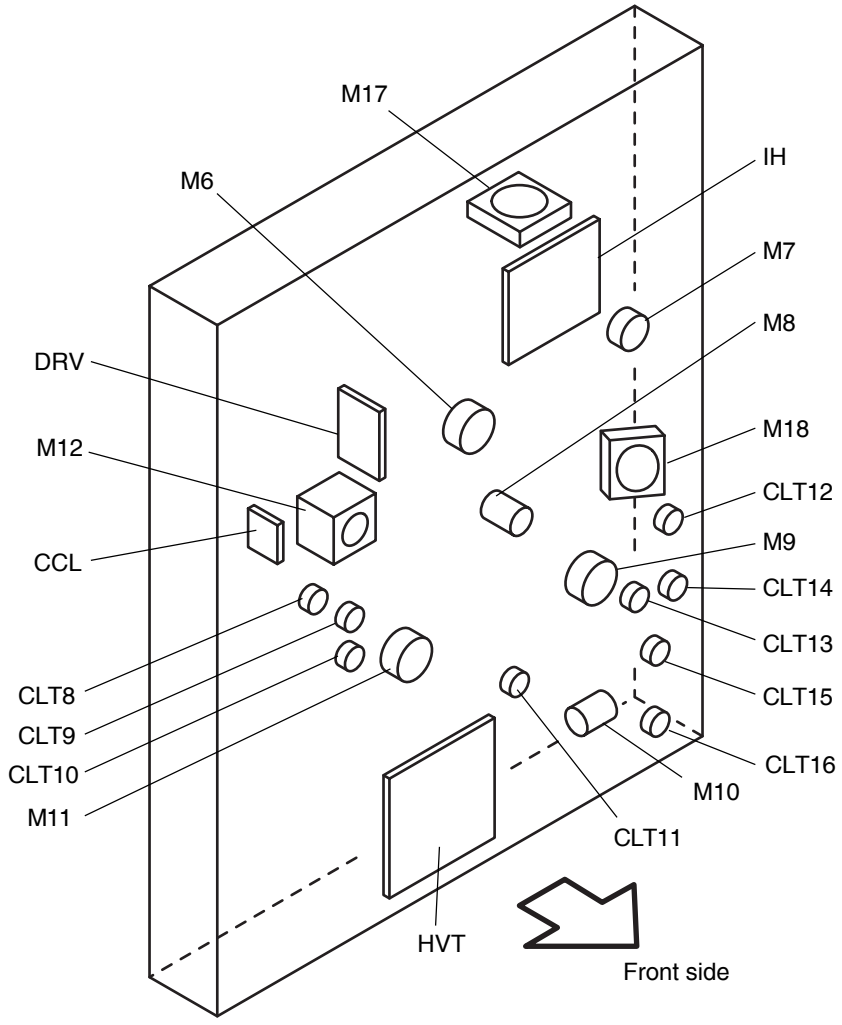
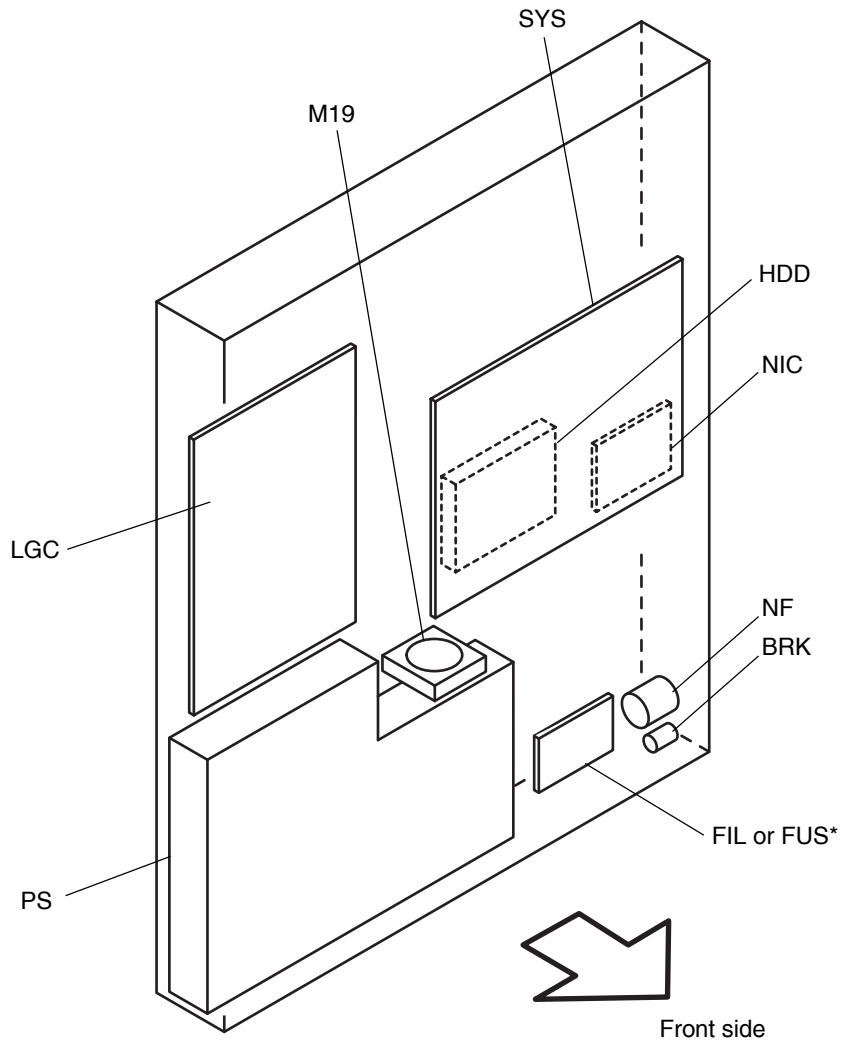


Fig. 2-214

[L] PC board unit



* NAD/SAD/TWD models: FIL (Standard),
  ASD/AUD/CND models: FUS (Standard),
  MJD model: FUS (Option)

Fig. 2-215

2.3 Symbols and Functions of Various Components

The column "P-I" shows the page and item number in the parts list.

(1) Motors

Symbol	Name	Function	Remarks	P-I
M1	SCAN-MOT Scan motor	Driving the carriages	B-1	P17 - I8
M2	BELT-CLN-MOT Transfer belt cleaner auger motor	Driving the transfer belt used toner auger	D-1	P31 - I24
M3	TNR-MOT Toner motor	Supplying the black toner	D-2	P37 - I16
M4	M/DC-POL Polygonal motor	Driving the polygonal mirror	E	P10 - I10
M5	ADU-MOT ADU motor	Driving the automatic duplexing unit	I	P42 - I18
M6	MAIN-MOT Main motor	Driving the drum and transfer belt	K	P14 - I6
M7	EXIT-MOT Exit motor	Driving the exit roller	K	P6 - I15
M8	DRM-CLN-MOT Drum cleaner brush motor	Driving the drum cleaner brush and used toner auger	K	P14 - I41
M9	TRSP-MOT Transport motor	Driving the fuser unit, 2nd transfer roller, registration roller, transport roller and feed roller	K	P16 - I26
M10	TRY-MOT Tray-up motor	Driving the lifting movement of trays in upper/lower drawer	K	P4 - I26
M11	DEV-MOT Developer motor	Driving the black/color developer unit Driving the lifting movement of the black developer unit Supplying the color toner Driving the transfer belt contact/ release movement	K	P15 - I1
M12	REVLV-MOT Revolver motor	Driving the revolver unit	K	P36 - I11
M13	CCL-MOT Charger cleaner motor	Driving the main charger wire cleaner	B-1	P28 - I35
M14	SLG-FAN-MOT SLG board cooling fan	Cooling down the SLG board	D-3	P11 - I15
M15	SCAN-FAN-MOT Scanner unit cooling fan	Cooling down the scanner unit	B-1	P17 - I27
M16	LSU-FAN-MOT Laser unit cooling fan	Cooling down the laser unit	D-1	P5 - I22
M17	IH-FAN-MOT IH control board cooling fan	Cooling down the IH board and SYS board	K	P8 - I12
M18	OZN-FAN-MOT Ozone exhaust fan	Exhausting ozone and cooling down the equipment inside	K	P14 - I49
M19	PS-FAN-MOT Power supply cooling fan	Cooling down the power supply unit	L	P7 - I9
M20	INTRNL-FAN-MOT Internal cooling fan	Cooling down the equipment inside	D-1	P1 - I35

(2) Sensors and switches

Symbol	Name	Function	Remarks	P-I
S1-5	APS 1-3, APS-C, APS-R Automatic original detection sensor	Original size detection	B-1	S1-4: P11 - I12 S5: P11 - I13
S6	HOME-SNR Carriage home position sensor	Carriage home position detection	B-1	P11 - I17
S7	PLTN-SNR Platen sensor	Opening/closing detection of platen cover or RADF	B-1	P17 - I10
S8	REVLV-HP-SNR Revolver home position sensor	Home position detection of the revolver unit	D-1	P36 - I102
S9	COLR-TNR-SNR Color toner cartridge sensor	Detecting the installation fault of color toner cartridge	D-1	P36 - I104
S10	COLR-ATTNR-SNR Color auto-toner sensor	Detecting toner density adhered on the magnetic roller of the color developer unit	D-1	P36 - I18
S11	K-DEV-POS-SNR Black developer contact position detection sensor	Detecting the black developer contact position	D-1	P35 - I17
S12	K-DEV-TIM-SNR Black developer contact timing detection sensor	Detecting the control of ON/OFF timing of the black developer lifting clutch	D-1	P35 - I17
S13	K-ATTNR-SNR Black auto-toner sensor	Detecting the density of toner in the black developer unit	D-2	P34 - I25
S14	K-TNR-SW Black toner cartridge switch	Black toner cartridge presence/ absence detection	D-2	P37 - I12
S15	TRBLT-HP-SNR1 Transfer belt home position sensor-1	Detecting the rotation position of transfer belt (for timing of speed switching in thick paper / OHP film mode)	D-1	P29 - I23
S16	TRBLT-HP-SNR2 Transfer belt home position sensor-2	Detecting the rotation position of transfer belt (for timing of the color image data writing)	D-1	P30 - I40
S17	TNLVL-SNR Image quality sensor	Toner amount detection on the transfer belt	D-2	P23 - I24
S18	TR2-POS-SNR 2nd transfer roller position detection sensor	Detecting the 2nd transfer roller contact position	G	P12 - I5
S19	TEMP/HUMI-SNR Temperature/humidity sensor	Detecting the temperature and humidity inside the equipment	D-1	P5 - I28
S20	USD-TNR-FLL-SNR1 Toner bag full detection sensor-1	Detecting the used toner is full in the toner bag	D-2	P6 - I11
S21	USD-TNR-FLL-SNR2 Toner bag full detection sensor-2	Detecting the presence/absence of the toner bag Used toner amount detection in the toner bag	D-1	P32 - I108
S22	RGST-SNR Registration sensor	Detecting the paper transport at the registration roller section	G	P23 - I6
S23	FED-U-SNR Upper drawer feed sensor	Detecting paper jam and paper transport at upper drawer feeding section	G	P23 - I6
S24	FED-L-SNR Lower drawer feed sensor	Detecting paper jam and paper transport at lower drawer feeding section	G	P24 - I52

Symbol	Name	Function	Remarks	P-I
S25	CCL-F-POS-SW Charger cleaner front position detection switch	Detecting the position when the main charger wire cleaner is moved to the front side	D-3	P28 - I103
S26	CCL-R-POS-SW Charger cleaner rear position detection switch	Detecting the position when the main charger wire cleaner is moved to the rear side	D-3	P28 - I103
S27	CST-U-TRY-SNR Upper drawer tray-up sensor	Position detection of the lifting tray of the upper drawer	F	P18 - I30
S28	CST-L-TRY-SNR Lower drawer tray-up sensor	Position detection of the lifting tray of the lower drawer	F	P18 - I30
S29	EMP-U-SNR Upper drawer empty sensor	Paper presence/absence detection in the upper drawer	F	P18 - I30
S30	EMP-L-SNR Lower drawer empty sensor	Paper presence/absence detection in the lower drawer	F	P18 - I30
S31	NEMP-U-SNR Upper drawer paper stock sensor	Paper amount detection in the upper drawer	F	P18 - I30
S32	NEMP-L-SNR Lower drawer paper stock sensor	Paper amount detection in the lower drawer	F	P18 - I30
S33	CST-U-SW Upper drawer detection switch	Detecting presence/absence of the upper drawer	F	P4 - I101
S34	CST-L-SW Lower drawer detection switch	Detecting presence/absence of the lower drawer	F	P4 - I101
S35	SFB-SNR Bypass paper sensor	Detecting presence/absence of paper on the bypass tray	H	P22 - I5
S36	SFB-FED-SNR Bypass feed sensor	Detecting the transporting paper fed from the bypass tray	H	P22 - I5
S37	ADU-SET-SW ADU opening/closing switch	Automatic duplexing unit opening/ closing detection	I	P42 - I43
S38	ADU-TRU-SNR ADU entrance sensor	Detecting the transporting paper at automatic duplexing unit entrance section	I	P42 - I31
S39	ADU-TRL-SNR ADU exit sensor	Detecting the transporting paper in automatic duplexing unit	I	P42 - I31
S40	EXIT-SNR Exit sensor	Detecting the transporting paper at the exit section	J	P40 - I32
S41	MAIN-SW Main switch	Turning ON/OFF of the equipment	B-2	P11 - I28
S42	FRNT-COV-SW Front cover opening/closing switch	Detecting opening/closing of the front cover	G	P5 - I105
S43	COV-INTLCK-SW Cover opening/closing interlock switch	Controlling cutoff and supply of the 24V voltage by opening/closing of the front cover or jam access cover	G	P5 - I15
S44	SIDE-COV-SW Side cover opening/closing switch	Side cover opening/closing detection	G	P24 - I51
S45	CLING-SNR Paper clinging detection sensor	Detecting whether the paper is clinging to the transfer belt or not	D-1	P41 - I25

(3) Electromagnetic clutches

Symbol	Name	Function	Remarks	P-I
CLT1	TRBLT-CLN-CLT Transfer belt cleaner clutch	Driving the transfer belt cleaning blade contact/release movement	D-1	P31 - I27
CLT2	CST-U-FEED-CLT Upper drawer feed clutch	Driving the upper drawer pickup roller	F	P18 - I29
CLT3	CST-L-FEED-CLT Lower drawer feed clutch	Driving the lower drawer pickup roller	F	P18 - I29
CLT5	2TR-CONT-CLT 2nd transfer roller contact clutch	Driving the 2nd transfer roller contact/release movement	G	P12 - I13
CLT6	SFB-FEED-CLT Bypass feed clutch	Driving the bypass pickup roller and bypass feed roller	H	P21 - I20
CLT7	ADU-CLT ADU clutch	Driving the automatic duplexing unit	I	P42 - I16
CLT8	COLR-DEV-TNR-CLT Color developer toner supply clutch	Driving the color developer toner supply auger	K	P15 - I10
CLT9	COLR-DEV-CLT Color developer drive clutch	Driving the color developer magnetic roller	K	P15 - I32
CLT10	K-DEV-CLT Black developer drive clutch	Driving the black developer magnetic roller	K	P15 - I28
CLT11	K-DEV-LIFT-CLT Black developer lifting clutch	Driving the black developer lifting cam	K	P15 - I12
CLT12	RGST-CLT Registration clutch	Driving the registration roller	K	P16 - I29
CLT13	CST-U-TR-L-CLT Upper transport clutch (Low speed)	Driving the upper transport roller (Low speed)	K	P16 - I19
CLT14	CST-U-TR-H-CLT Upper transport clutch (High speed)	Driving the upper transport roller (High speed)	K	P16 - I30
CLT15	CST-L-TR-L-CLT Lower transport clutch (Low speed)	Driving the lower transport roller (Low speed)	K	P19 - I20
CLT16	CST-L-TR-H-CLT Lower transport clutch (High speed)	Driving the lower transport roller (High speed)	K	P19 - I16

(4) Solenoids

Symbol	Name	Function	Remarks	P-I
SOL1	ATTNR-SHUT-SOL Color auto-toner sensor shutter solenoid	Driving the color auto-toner sensor shutter	D-1	P36 - I25
SOL2	TNLVL-SHUT-SOL Image quality sensor shutter solenoid	Driving the image quality sensor shutter	D-2	P23 - I21
SOL3	SFB-SOL Bypass pickup solenoid	Driving the bypass pickup roller	H	P22 - I11

(5) PC boards

Symbol	Name	Function	Remarks	P-I
CCD	PWA-F-CCD CCD driving PC board (CCD board)	Controlling CCD and A/D conversion of image data	B-2	P11 - I10
SLG	PWA-F-SLG Scanning section control PC board (SLG board)	Controlling the original scanning section and RADF	B-2	P11 - I38
SDV	PWA-F-SDV Scan motor driving PC board (SDV board)	Driving the scan motor	B-2	P17 - I21
DSP	PWA-F-DSP Display PC board (DSP board)	Controlling LCD and the touch panel on the control panel	C	P3 - I26
KEY	PWA-F-KEY Key control PC board (KEY board)	Detecting the button entry and controlling LED on the control panel	C	P3 - I25
LDR	PWA-F-LDR Laser driving PC board (LDR board)	Driving the laser diode	E	P10 - I10
SNS	PWA-F-SNS H-sync signal detection PC board (SNS board)	Detection of the laser beam position	E	P10 - I10
SFB	PWA-F-SFB Bypass tray slide guide width detection PC board (SFB board)	Detection of the bypass tray slide guide width	H	P20 - I13
ADU	PWA-F-ADU ADU driving PC board (ADU board)	Controlling the automatic duplexing unit	I	P42 - I30
IH	PS-IH IH control PC board (IH board)	Controlling each IH coil in the fuser unit	K	P8 - I2
DRV	PWA-F-DRV Driving PC board (DRV board)	Controlling each motor and fan in the system	K	P9 - I8
CCL	PWA-F-CCL Charger cleaner driving PC board (CCL board)	Driving the charger cleaner motor	K	P9 - I13
SYS	PWA-F-SYS System control PC board (SYS board)	Controlling the whole system and image processing	L	P8 - I34
LGC	PWA-F-LGC Logic PC board (LGC board)	Controlling the print engine section	L	P9 - I7
NIC	PWA-F-NIC NIC board	Network connection interface	L	P8 - I22
FIL	PWA-F-FIL Filter PC board (FIL board)	Cutting noise of the AC power Power supplying to each damp heater * NAD/SAD/TWD models: Standard	L	P7 - I11
FUS	PWA-F-FUS Fuse PC board (FUS board)	Power supplying to each damp heater * ASD/AUD/CND models: Standard * MJD model: Option	L	P7 - I4

(6) Lamps and heaters

Symbol	Name	Function	Remarks	P-I
EXP	LP-EXPO Exposure lamp	Exposing the original to the light	B-1	P26 - I6
ERS	LP-ERS Discharge LED	Removing the residual charge from the drum surface	D-2	P28 - I12
IH-COIL	IH-COIL IH coil	Heating the fuser roller	J	P41 - I7
DH1	SCN-L-DH Scanner damp heater (Left)	Preventing condensation of the mirrors of the carriages * ASD/AUD/CND/SAD/TWD models: Standard * NAD/MJD models: Option	B-2	P11 - I22
DH2	SCN-R-DH Scanner damp heater (Right)	Preventing condensation of the lens * ASD/AUD/CND/SAD/TWD models: Standard * NAD/MJD models: Option	B-2	P11 - I32
DH3	DRM-DH Drum damp heater	Preventing condensation of the drum * ASD/AUD/CND/SAD/TWD models: Standard * NAD/MJD models: Option	D-2	P35 - I23

(7) Thermistors and thermostats

Symbol	Name	Function	Remarks	P-I
THM1	THMS-EDGE-FBLT Front edge thermistor	Detecting the surface temperature at the edge of the front side of the fuser belt (for preventing overheating at the edge of the fuser belt)	J	P41 - I15
THM2	THMS-MAIN-FBLT Main thermistor	Detecting the surface temperature at the fuser belt center (for controlling the center IH coil)	J	P41 - I15
THM3	THMS-SUB-FBLT Sub thermistor	Detecting the surface temperature at the front side of the fuser belt (for controlling the side IH coil)	J	P41 - I15
THM4	THMS-DRM Drum thermistor	Detecting the temperature at the drum surface	D-2	P32 - I13
THMO1	THERMO-FSR Fuser thermostat	Preventing overheating in the fuser unit	J	P41 - I12
THMO2	THERMO-SCN-DH Scanner damp heater thermostat	Controlling the temperature of the scanner damp heater * ASD/AUD/CND/SAD/TWD models: Standard * NAD/MJD models: Option	B-2	P11 - I22
THMO3	THERMO-DRM-DH Drum damp heater thermostat	Controlling the temperature of the drum damp heater * ASD/AUD/CND/SAD/TWD models: Standard * NAD/MJD models: Option	D-2	P35 - I24

(8) Transformer

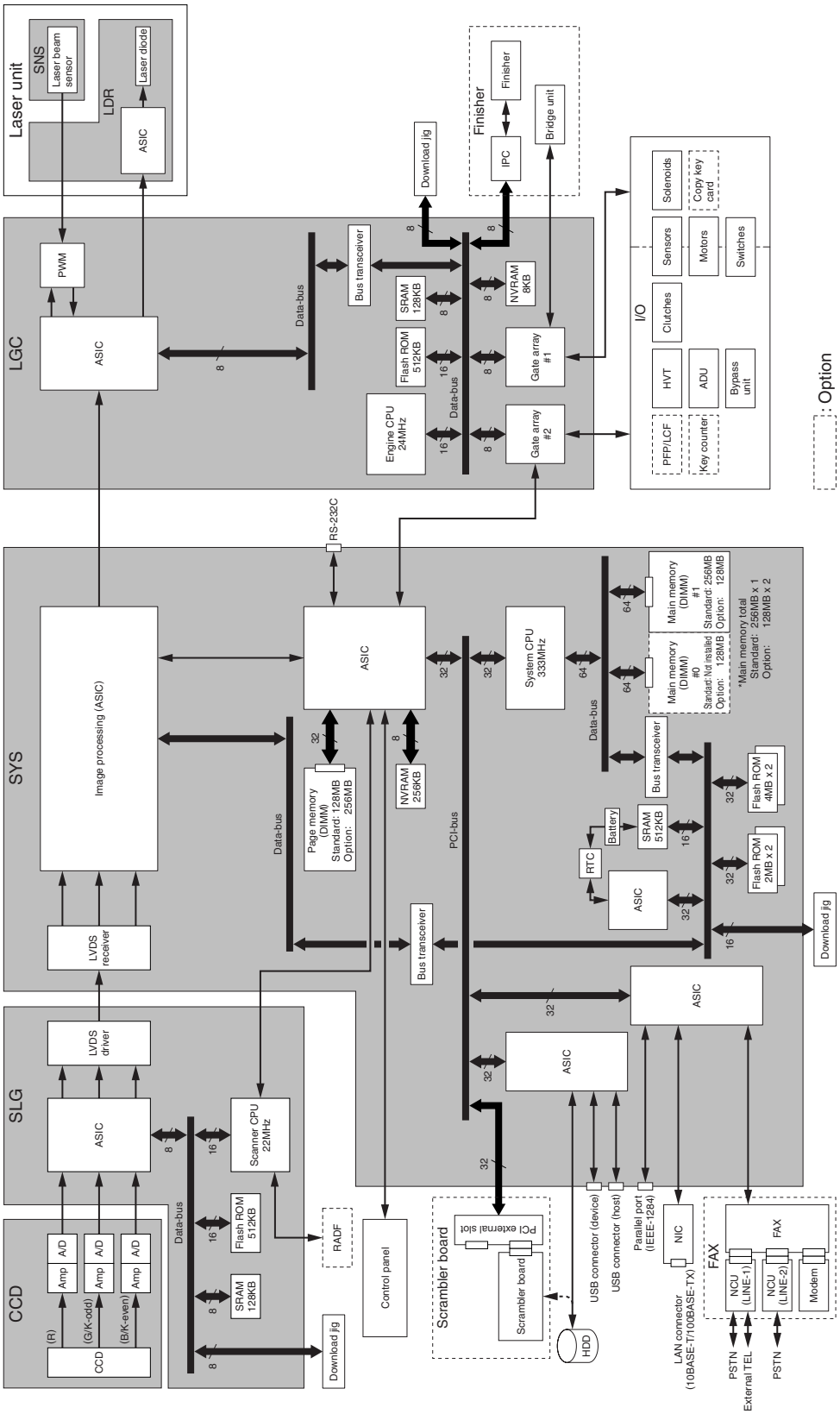
Symbol	Name	Function	Remarks	P-I
HVT	PS-HVT High-voltage transformer	Generating high-voltage and supplying it to the following sections • Main charger wire • Main charger grid • Developer bias (color and black) • Transfer bias (1st and 2nd transfer)	K	P7 - I10

(9) Others

Symbol	Name	Function	Remarks	P-I
INV	INV-EXP Inverter board	Controlling the exposure lamp	B-2	P26 - I7
LCD	LCD LCD panel	Displaying and entering each information	C	P3 - I19
HDD	HDD Hard disk	Storing the program data and image data	L	P8 - I25
PS	PS-ACC Switching power supply	Generating DC voltage and supplying it to each section of the equipment	L	P7 - I9
NF	NS-FILTER Noise filter	Cutting noise of AC power	L	P7 - I2
BRK	BREAKER Breaker	Preventing the inflow of overcurrent to the equipment	L	P7 - I3

2.4 General Description

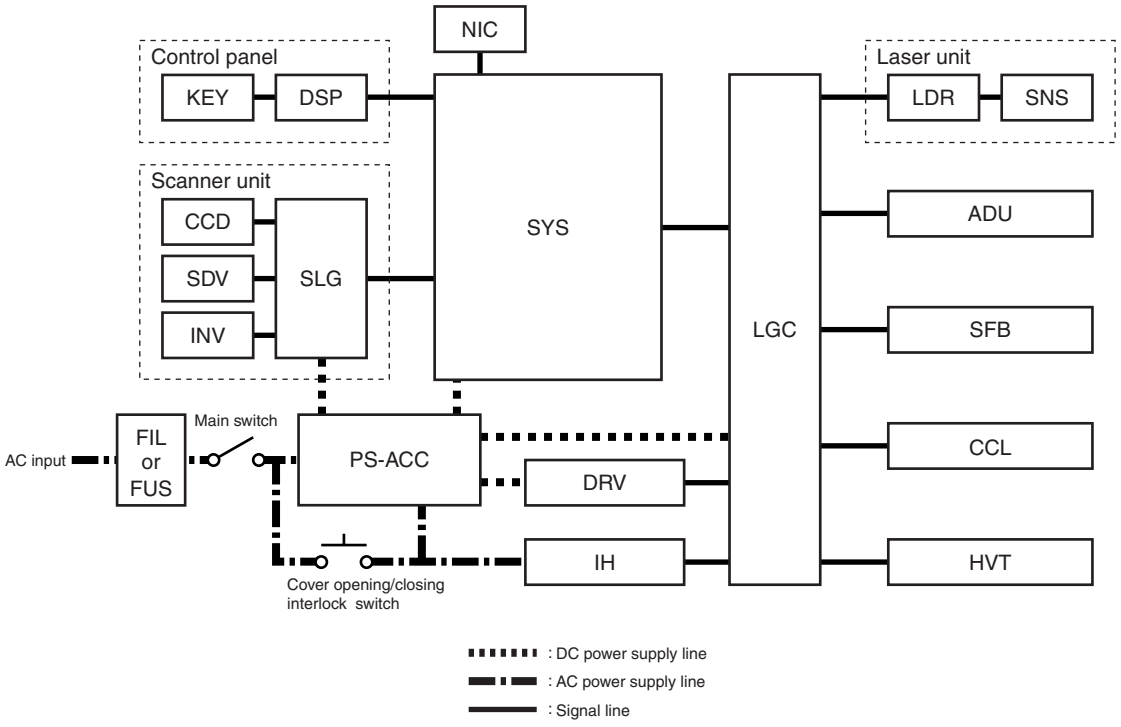
2.4.1 System block diagram



2.4.2 Construction of boards

(a) Construction diagram of boards

This system consists of the following including the SYS board as a main board.



(b) Function of each board

CCD board:

This is the board to convert the reflected light by the original to electrical signals. It consists of the CCD, A/D converter, etc. The CCD converts the reflected light by the original to three-color analog signal; red, green, blue, and the A/D converter converts each analog signal to digital.

SLG board:

This is the board to mainly control the scanning function (scanner unit) and consists of the Scanner-CPU, ASIC, memory (Flash ROM, SRAM), etc. When scanning the original, the exposure lamp and scan motor are started by the command from the Scanner-CPU. And the image processing is performed for the image data sent from the CCD by each ASIC.

SDV board:

This is the board on which the driver for driving the scan motor is mounted. The scan motor is started by the command from the Scanner-CPU.

INV board:

This is the board on which the lighting control circuit of the exposure lamp is mounted. The exposure lamp lights by the command from the Scanner-CPU.

DSP board:
This is the board to mainly control the control panel. The Panel processing CPU detecting the input from each button and touch panel, and the lighting control circuit for the backlight of the LCD are mounted. And it relays the control signal of the control panel from the SYS board to the LCD and KEY board.

KEY board:
This is the board on which each button switch and each LED on the control panel are mounted.

LDR board:
This is the board on which the laser diode and the ASIC are mounted. The laser is emitted based on the output image data signal from the ASIC on the LGC board.

SNS board:
This is the board on which the light sensor for detecting the radiating position of the laser is mounted. It outputs the H-sync signal to the PWM (Pulse Width Modulator) on the LGC board.

SFB board:
This is the board on which the circuit pattern is printed. It detects the position of the slide guide of the bypass unit.

CCL board:
This is the board on which the driver for driving the charger cleaner motor is mounted.

ADU board:
This is the board to relay each signal between the ASIC on the LGC board and the electric parts (motor, sensor, clutch) in the ADU.

IH board:
This is the board to generate the electric power for driving the IH coil of the fuser unit from the AC electric power input via the switching power supply. And then it is provided.

DRV board:
This is the board on which the driver for driving the revolver motor, exit motor, and each fan motor are mounted.

SYS board:
This is the main board taking a leading part in all systems. It consists of the System-CPU, ASIC, memory (DIMM, Flash ROM, SRAM, NVRAM), RTC (Real Time Clock IC) etc. The System-CPU controls each ASIC to perform the control of the image processing, image memory (page memory, main memory, HDD), external interface (RS-232C, IEEE-1284, USB, PCI), NIC, and FAX. And based on the input data from the control panel, System-CPU communicates with Scanner-CPU on the SLG board and Engine-CPU on the LGC board, and then issues an operation command to the scanner and printer engine section.

LGC board:
This is the board to mainly control the print function (printer engine). It consists of the Engine-CPU, ASIC, memory (Flash ROM, SRAM, NVRAM), etc. The Engine-CPU controls each ASIC to drive I/O (electrical parts) of each section in the system. It leads to the operation of the laser unit, revolver, developer unit, drum, transfer belt, drawers, bypass unit, ADU, etc. And then the print is made.

NIC board:
This is the interface board to connect this equipment to the LAN environment (10BASE-T, 100BASE-TX) to communicate with PCs, etc.

FIL board:
This is the board to cut off the noise of AC power from outside, and supply the driving AC power to the damp heater for condensation prevention of each section (scanner and drum).

FUS board:
This is the board to provide the AC electric power for driving to the damp heater for preventing of the condensation of each section (scanner and drum).

HVT:
This is the board to generate the DC high voltage from +24V to provide the bias to the section of the main charger, developer, and transfer.

PS-ACC:
This is the unit to generate each DC voltage, which is used in the equipment, from external AC electric power input. And then it is provided to each electric part.

2.5 Disassembly and Replacement of Covers and PC boards

2.5.1 Covers

[A] Front cover / Toner bag

(1) Open the front cover.

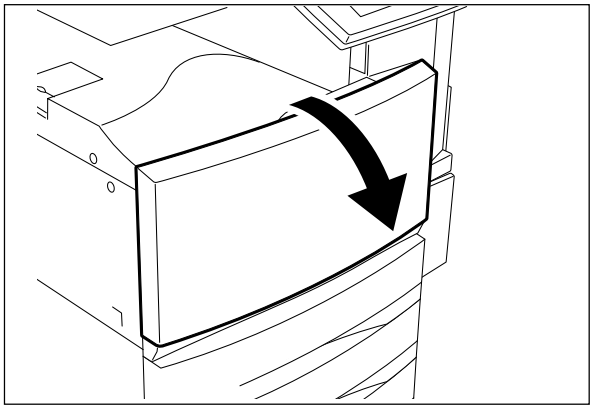


Fig. 2-501

(2) Remove the toner bag.

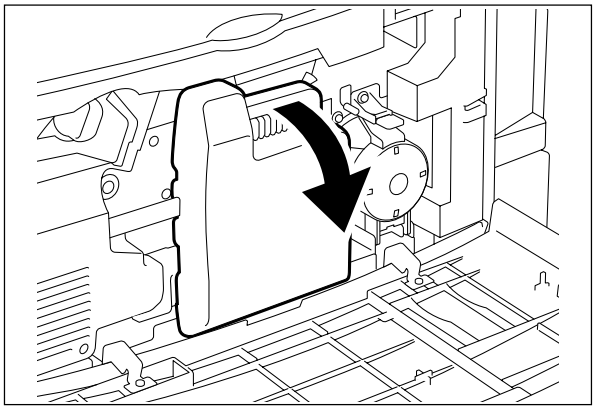


Fig. 2-502

(3) Pull up 2 hinge pins (on the left and the right) and then extract them inside.

(4) Take off the front cover.

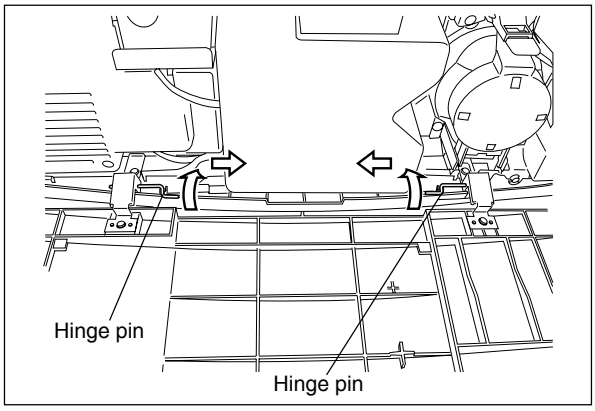


Fig. 2-503

[B] Receiving tray

(1) Open the front cover (► Chapter 2.5.1 [A]).

(2) Remove 2 screws and pull out the receiving tray.

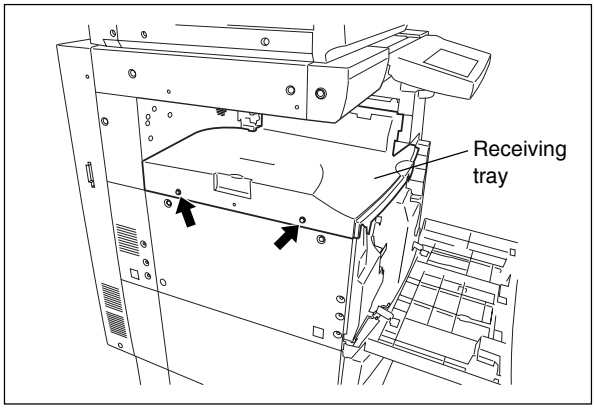


Fig. 2-504

[C] Tray back cover

(1) Remove the receiving tray (► Chapter 2.5.1 [B]).
(2) Remove 1 screw and take off the tray back cover.

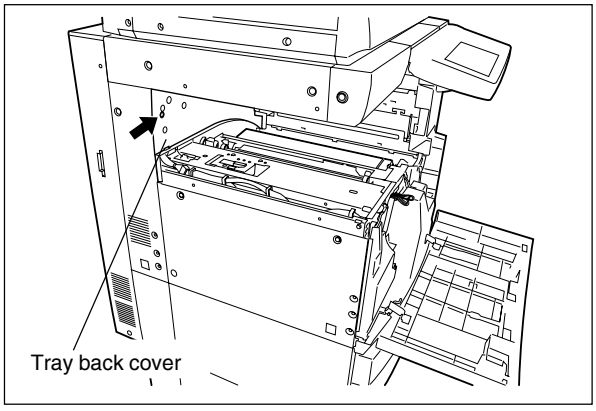


Fig. 2-505

[D] Front lower cover

(1) Take off the front cover (► Chapter 2.5.1 [A]).
(2) Take off the black developer unit cover (► Chapter 12.8 (A-1)).
(3) Release 4 latches and take off the front lower cover.

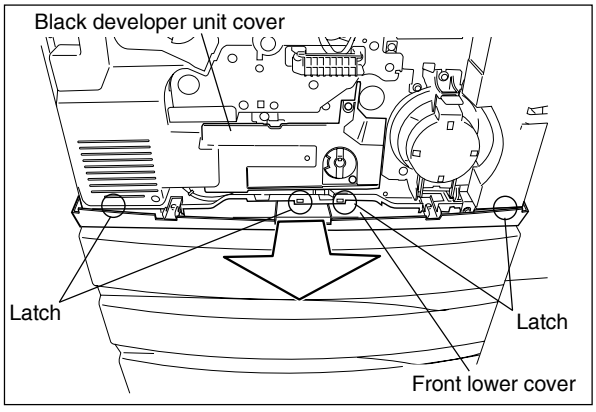


Fig. 2-506

[E] Front right cover

(1) Take off the front lower cover (► Chapter 2.5.1 [D]).
(2) Remove 2 screws and take off the front right cover.

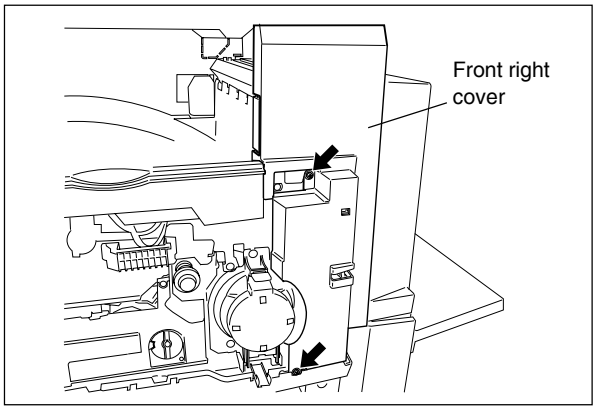


Fig. 2-507

[F] Left cover

(1) Open the front cover (► Chapter 2.5.1 [A]).
(2) Remove 4 screws and take off the left cover.

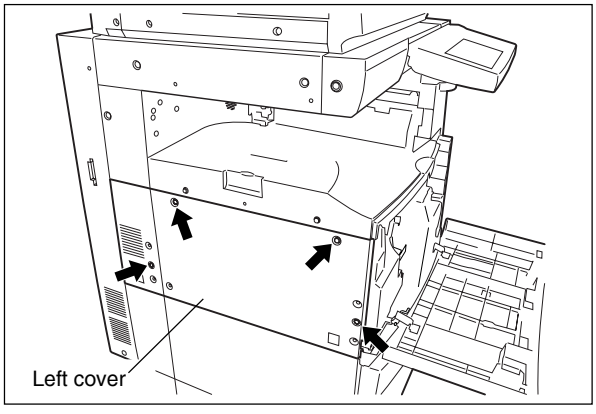


Fig. 2-508

[G] Left rear cover

(1) Remove 2 screws and take off the left rear cover.

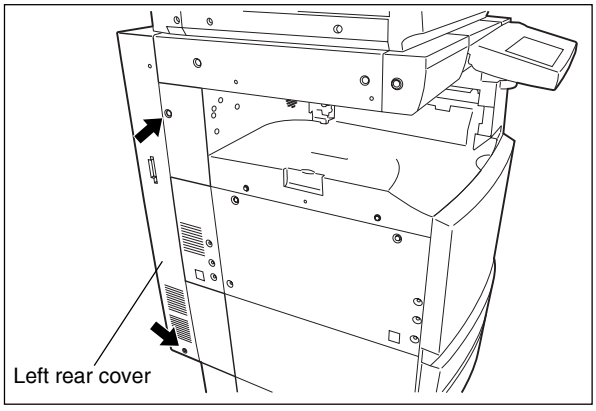


Fig. 2-509

[H] Left upper cover

(1) Remove 2 screws and take off the left upper cover.

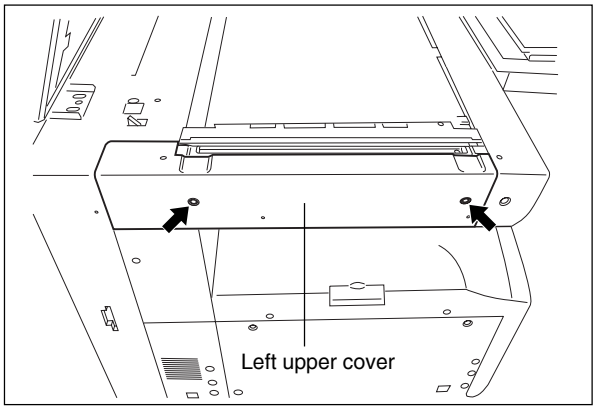


Fig. 2-510

[I] Front upper cover

(1) Take off the left upper cover (► Chapter 2.5.1 [H]).

(2) Remove 2 screws. Take off the front upper cover.

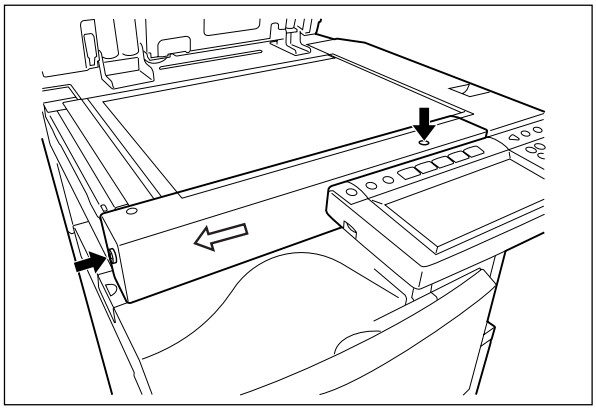


Fig. 2-511

[J] Right upper cover

(1) Remove 3 screws and take off the right upper cover.

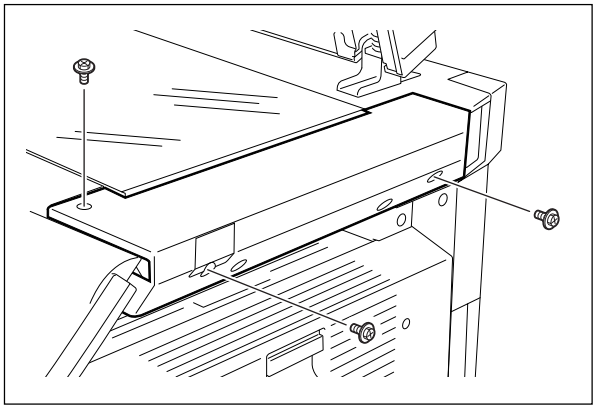


Fig. 2-512

[K] IH terminal cover

Caution:
Be sure to unplug before the work, not to get an electricshock.

(1) Open the ADU.
(2) Open the jam access cover.
(3) Open the fuser unit cover.

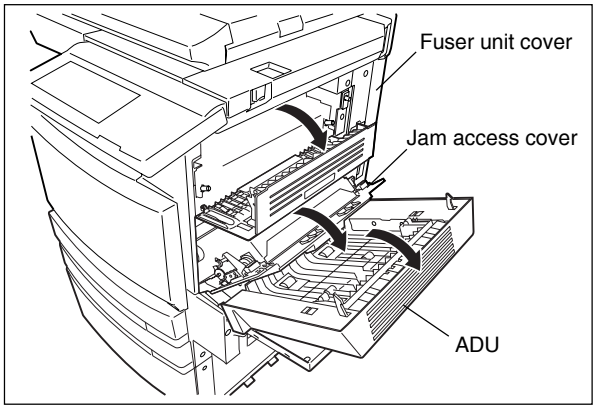


Fig. 2-513

(4) Remove 2 screws and take off the IH terminal cover.

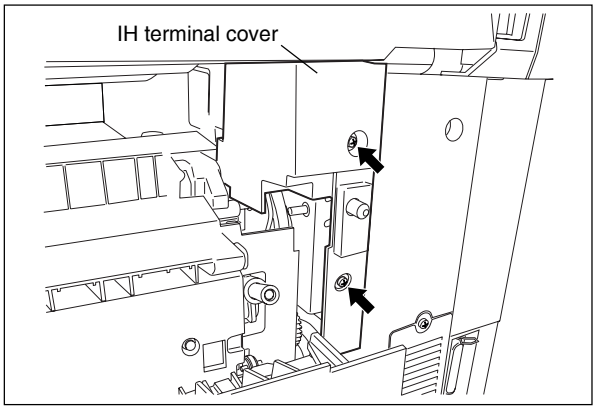


Fig. 2-514

[L] Right rear cover

(1) Open the ADU.

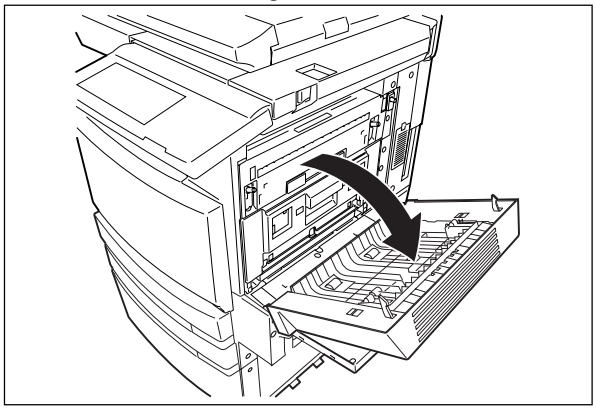


Fig. 2-515

(2) Take off the IH terminal cover (► Chapter 2.5.1 [K]).
(3) Remove 1 screw and take off the ozone filter cover.
(4) Remove 2 screws and take off the right upper cover (► Chapter 2.5.1 [J]).
(5) Remove 2 screws and take off the right rear cover.

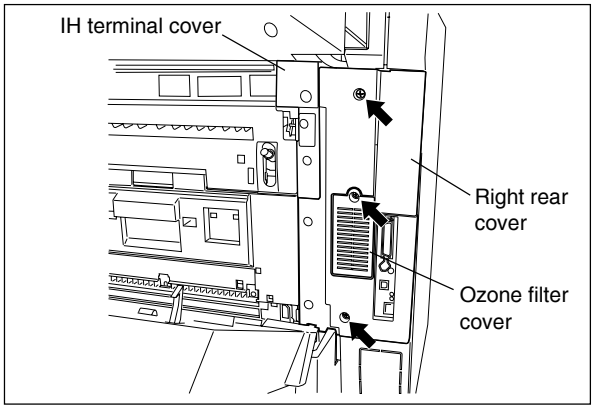


Fig. 2-516

[M] Right lower cover

(1) Take off the right rear hinge cover (► Chapter 2.5.1 [N]).
(2) Remove 2 screws and take off the right lower cover.

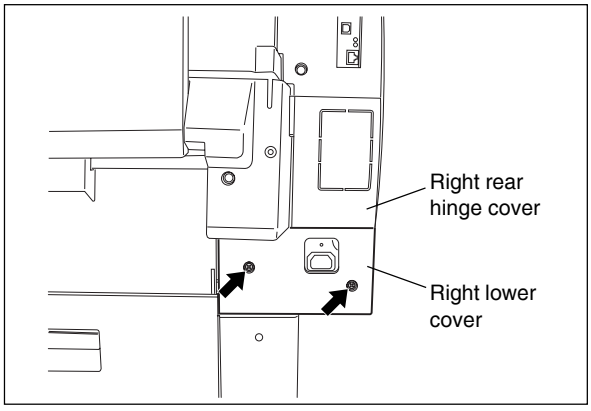


Fig. 2-517

[N] Right rear hinge cover

(1) Remove 2 screws and take off the right rear hinge cover.

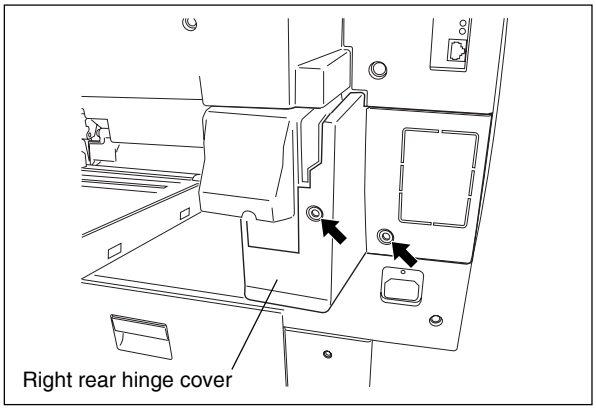


Fig. 2-518

[O] Right front hinge cover

(1) Pull out the upper and lower drawers slightly.
(2) Remove 2 screws and take off the right front hinge cover.

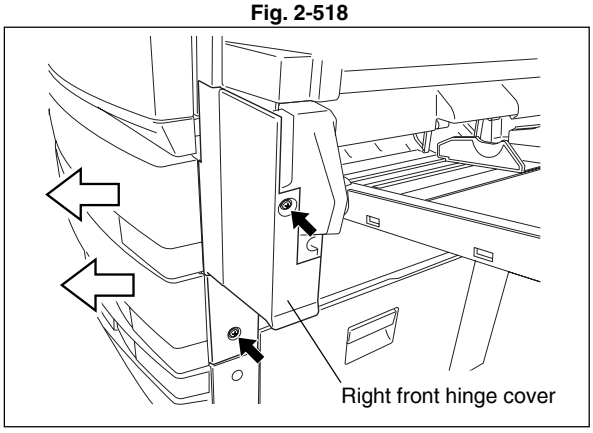


Fig. 2-519

[P] Rear cover

(1) Remove 7 screws and take off the rear cover.

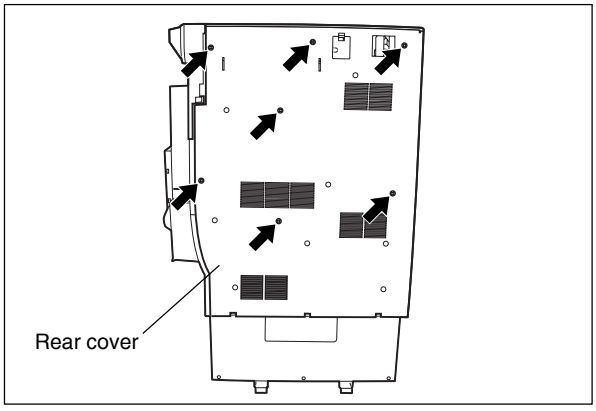


Fig. 2-520

[Q] Upper rear cover

(1) Take off the ADF or the platen cover.
(2) Take off the left upper cover (► Chapter 2.5.1 [H]).
(3) Take off the right upper cover (► Chapter 2.5.1 [J]).
(4) Remove 2 screws and take off the upper rear cover.

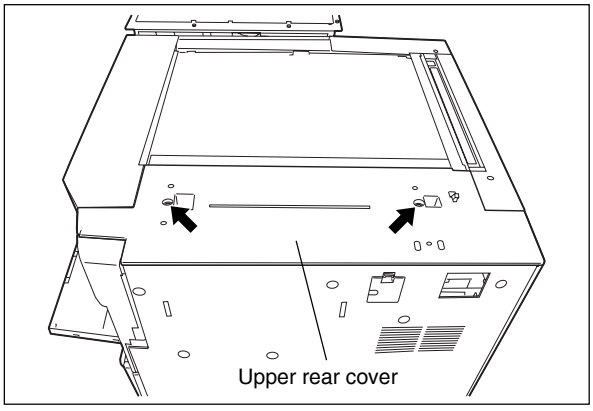


Fig. 2-521

2.5.2 PC boards

Note: When the PC board/HDD is replaced, refer to each CAUTIONS of TROUBLESHOOTHING in the SERVICE HANDBOOK.

[A] Logic PC board (LGC board)

(A-1) LGC board case

(1) Take off the rear cover (► Chapter 2.5.1 [P]).

(2) Loosen 13 screws and take off the LGC board cover (plate cover).

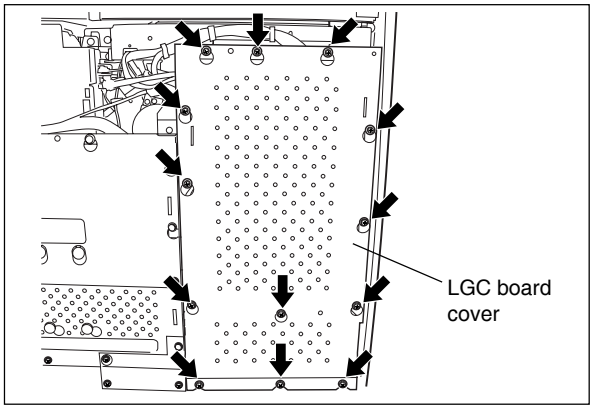


Fig. 2-522

(3) Disconnect 20 connectors, release 12 harnesses from harness clamps, remove 5 screws and take off the whole LGC board with the case.

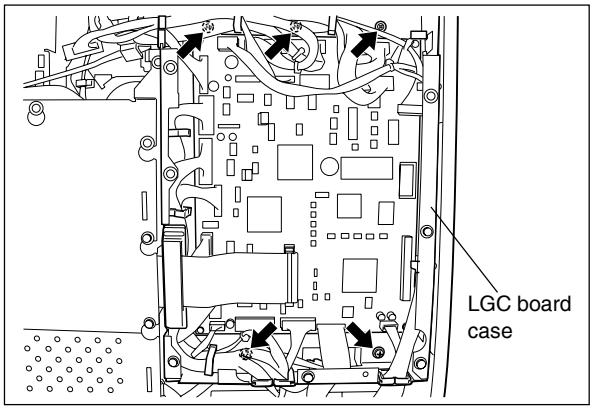


Fig. 2-523

(A-2) LGC board

(1) Take off the rear cover (► Chapter 2.5.1 [P]).

(2) Loosen 13 screws and take off the LGC board cover (plate cover) (► Chapter 2.5.2 (A-1).

(3) Disconnect 20 connectors.

(4) Remove 4 screws and release 2 locking supports, take off the LGC board.

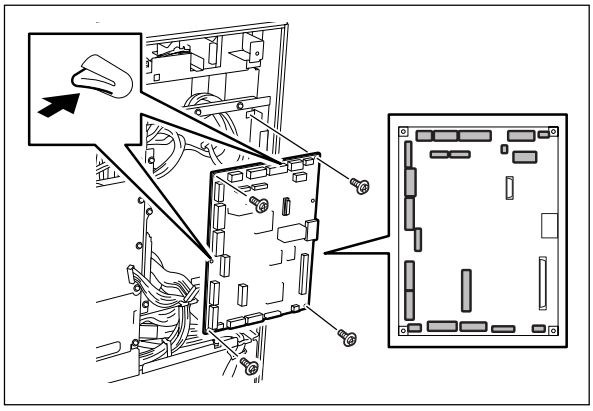


Fig. 2-524

[B] Hard disk (HDD)

(1) Take off the rear cover (► Chapter 2.5.1 [P]).

(2) Loosen 4 screws and take off the HVT cover.

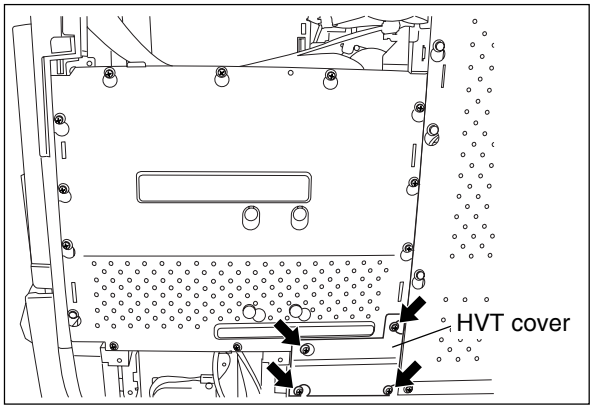


Fig. 2-525

(3) Loosen 9 screws and take off the SYS board upper cover.

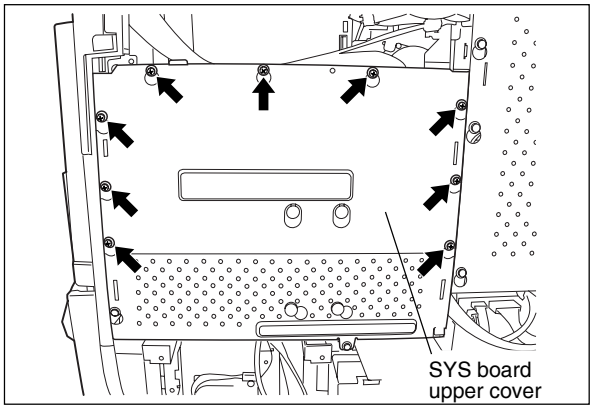


Fig. 2-526

(4) Loosen 3 screws, disconnect 2 connectors and take off the SYS board lower cover.

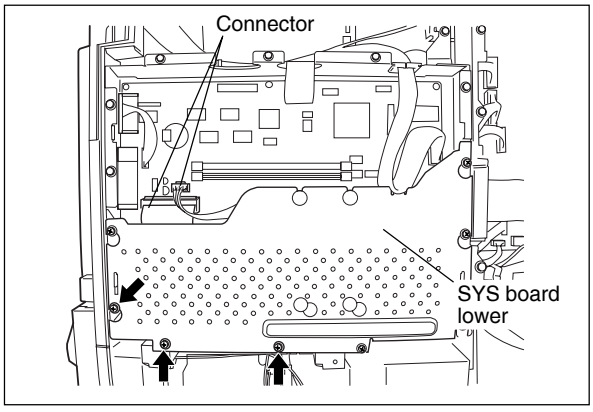


Fig. 2-527

(5) Remove 4 screws and take off the hard disk from the SYS board lower cover.

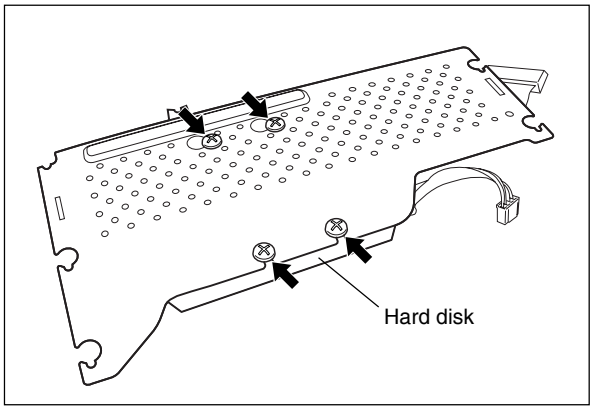


Fig. 2-528

[C] System control PC board case

(SYS board case)

(1) Take off the SYS board lower cover (► Chapter 2.5.2 [B]).

(2) Disconnect 5 connectors.

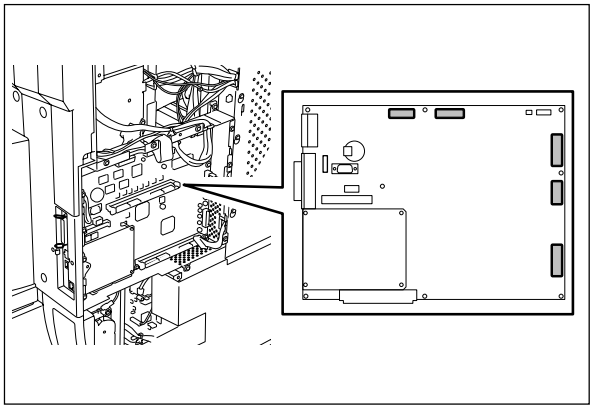


Fig. 2-529

(3) Remove 4 screws and take off the SYS board case.

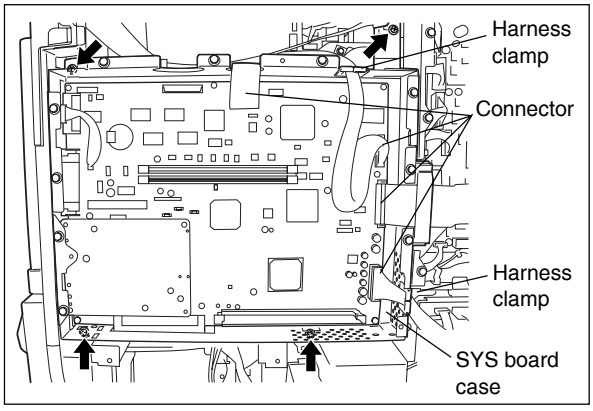


Fig. 2-530

[D] NIC board / System control PC board (SYS board)

(1) Take off the SYS board lower cover (► Chapter 2.5.2 [B]).

(2) Disconnect 6 connectors.

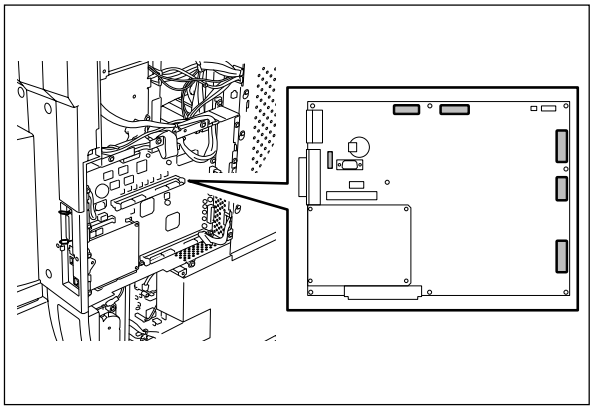


Fig. 2-531

(3) Remove 2 screws, release 1 lock support. Then take off the NIC board.

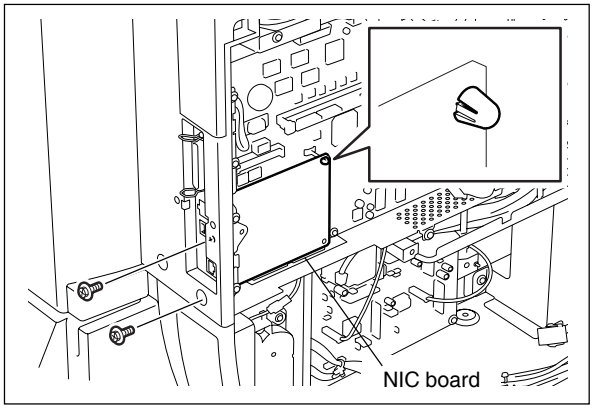


Fig. 2-532

(4) Remove 9 screws, release 1 lock support. Then take off the SYS board.

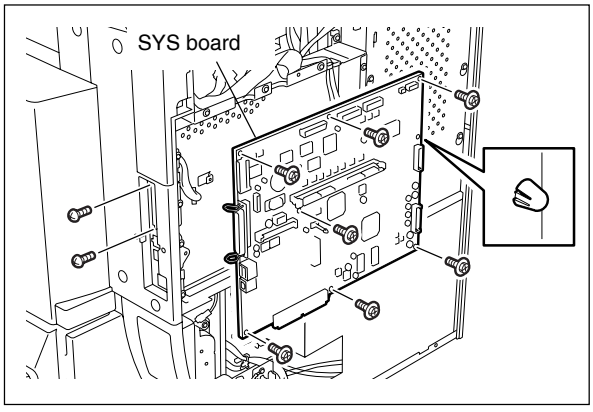


Fig. 2-533

[E] Power supply unit

(1) Take off the rear cover (► Chapter 2.5.1 [P]).
(2) Disconnect 8 connectors.
(3) Remove 3 screws and take off the whole switching power supply unit with the bracket.

Note: Be careful not for the power supply unit to be caught by harnesses.

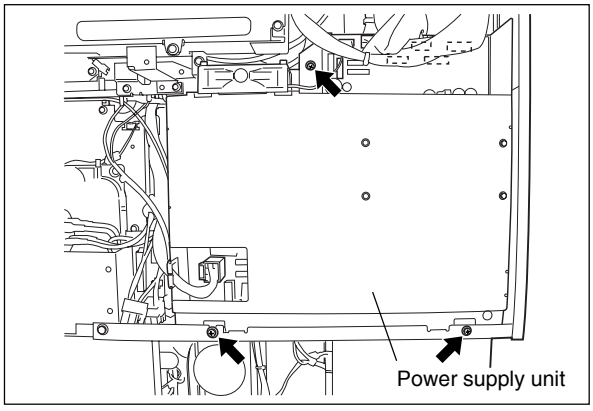


Fig. 2-534

(4) Disconnect 1 connector, remove 4 screws and take off the power supply cooling fan.

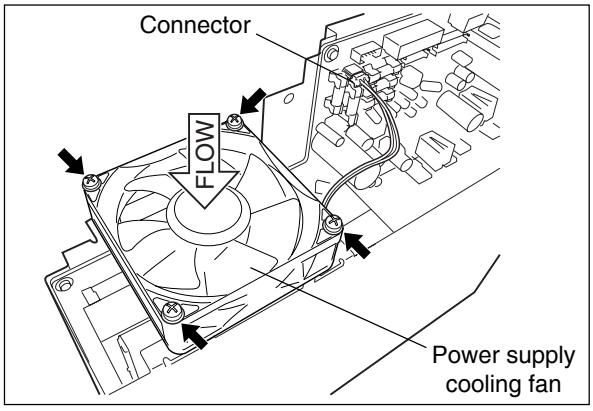


Fig. 2-535

(5) Remove 11 screws and take off the cover of the power supply unit.

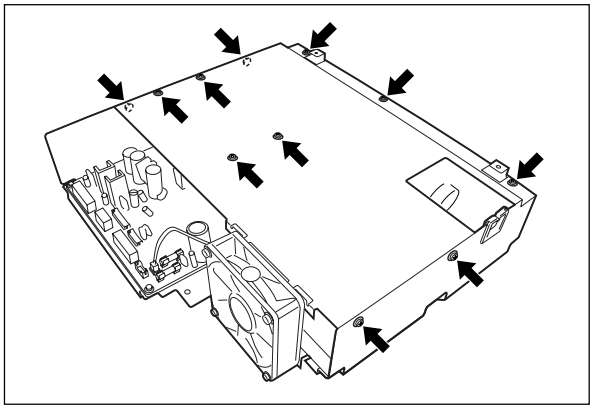


Fig. 2-536

[F] High-voltage transformer

(1) Take off the power supply unit (► Chapter 2.5.2 [E]).
(2) Disconnect 8 connectors, remove 2 screws, release 2 lock supports (white arrow) and take off the high-voltage transformer.

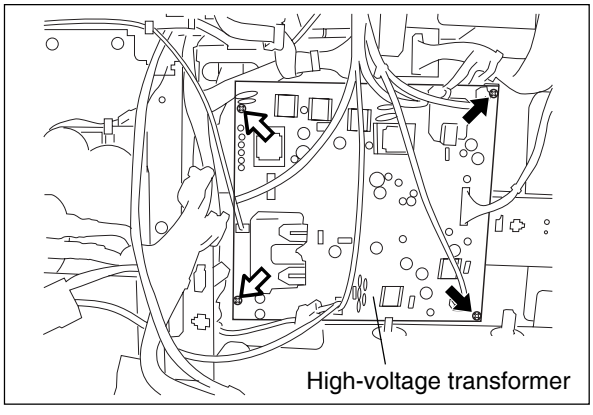


Fig. 2-537

[G] Noise filter

(1) Take off the right rear hinge cover and the right lower cover (► Chapter 2.5.1 [N] [M]).

(2) Disconnect 4 connectors, remove 1 screw and take off the noise filter.

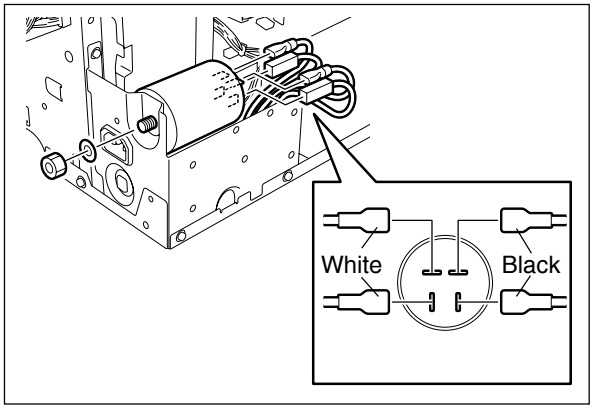


Fig. 2-538

[H] Fuse board (FUS board)

(1) Take off the right rear hinge cover and the right lower cover (► Chapter 2.5.1 [N] [M]).

(2) Remove 5 screws to take off the unit and turn it over.

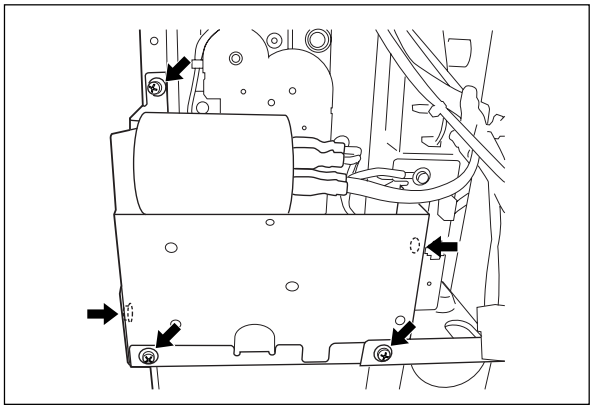


Fig. 2-539

(3) Disconnect 3 connectors and release 4 lock supports (white arrow) to take off the fuse board.

Note: FUS board is not included for MJD and NAD.

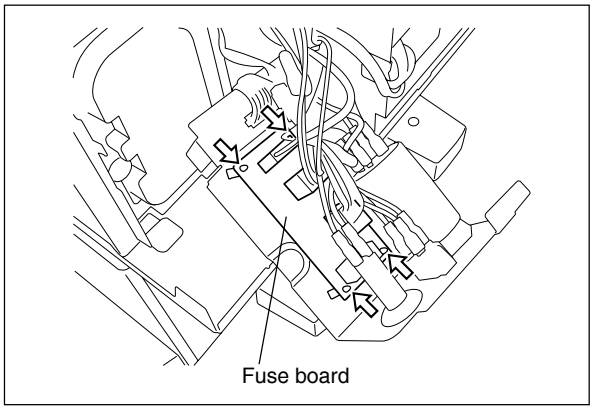


Fig. 2-540

[I] Driving PC board (DRV board)

(1) Take off the LGC board case (► Chapter 2.5.2 [A]).

(2) Disconnect 5 connectors, remove 1 screw and DRV board with the bracket.

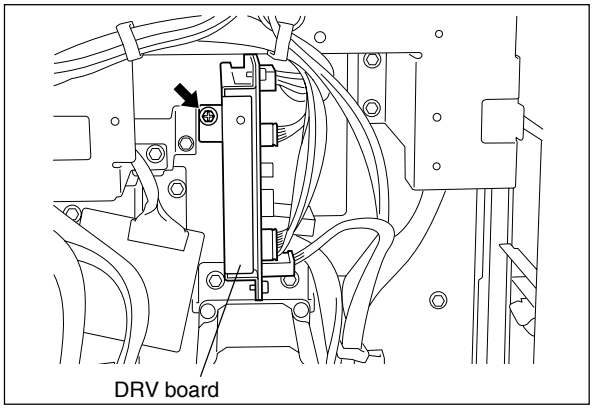


Fig. 2-541

2.5.3 Options

[A] MR-3015 (Reversing Automatic Document Feeder (RADF))

(1) Turn OFF the power and unplug the power cable.

(2) Take off the connector cover.

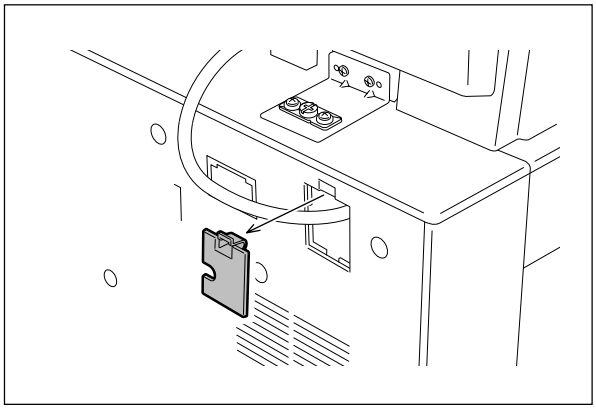


Fig. 2-542

(3) Disconnect the connector.

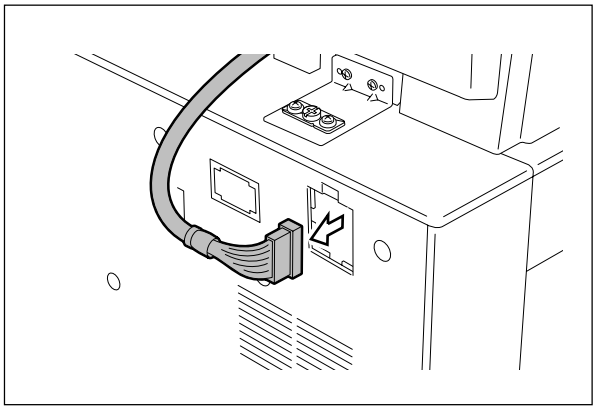


Fig. 2-543

(4) Remove 2 screws on the rear side.

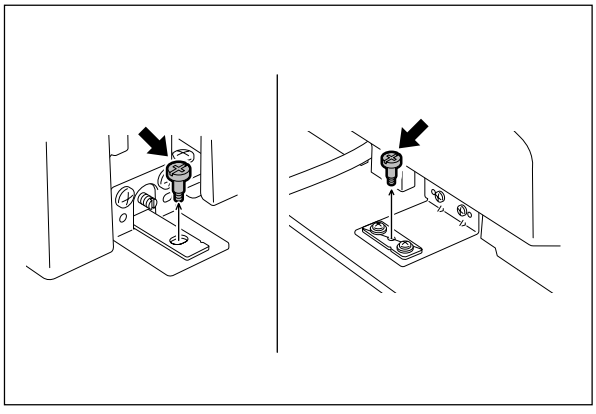


Fig. 2-544

(5) Open the RADF.

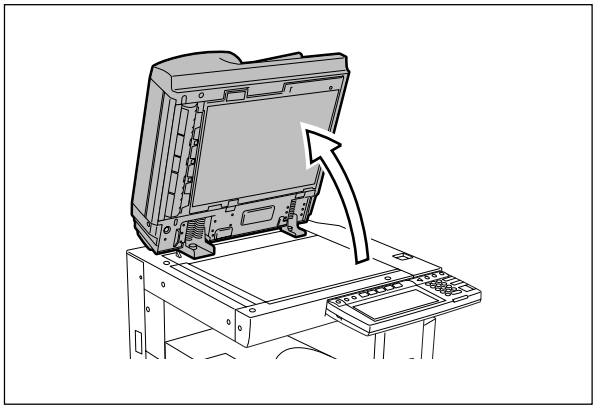


Fig. 2-545

(6) Remove 2 screws on the front side.

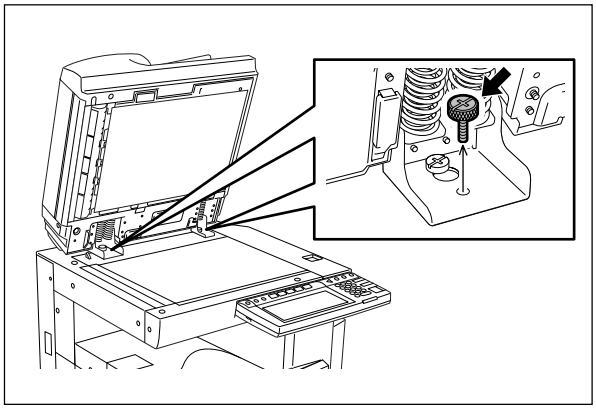


Fig. 2-546

(7) Slide the RADF backward and take off by lifting it up.

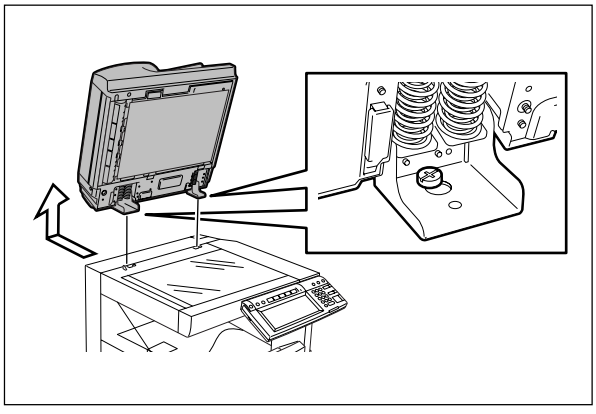


Fig. 2-547

Note: When disinstalling the RADF and installing the platen cover, or disinstalling the platen cover and installing the RADF, tighten the screw which installs the damper holding bracket of the scanner at the following positions.

Installing the RADF: A
Installing the platen cover: B

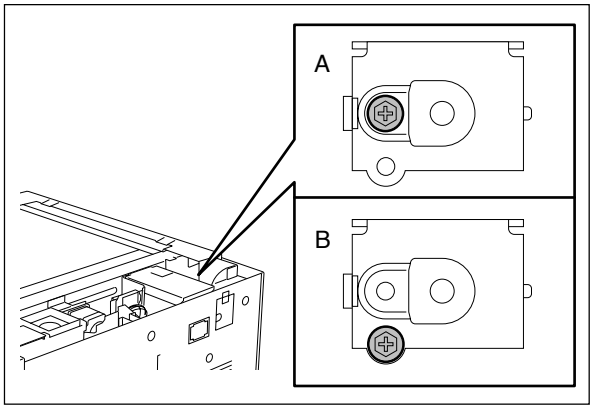


Fig. 2-548

[B] KD-1011 (Paper Feed Pedestal (PFP))

(1) Turn OFF the power and unplug the power cable.

(2) Remove 7 screws and take off the rear cover of the equipment.

Note: Disconnect the connector of the RADF first when the RADF is installed.

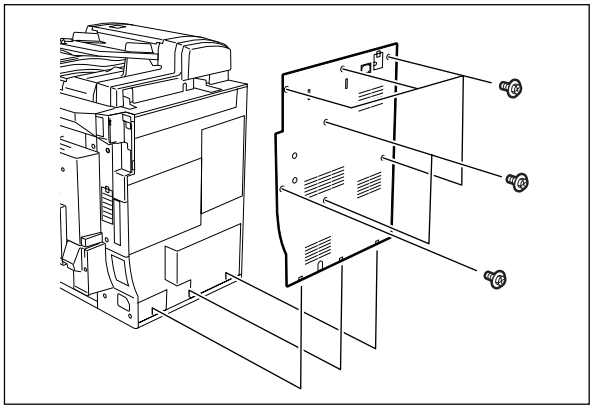


Fig. 2-549

(3) Remove 1 screw and the ground wire, and then disconnect 2 connectors (3 if the optional damp heater is installed).

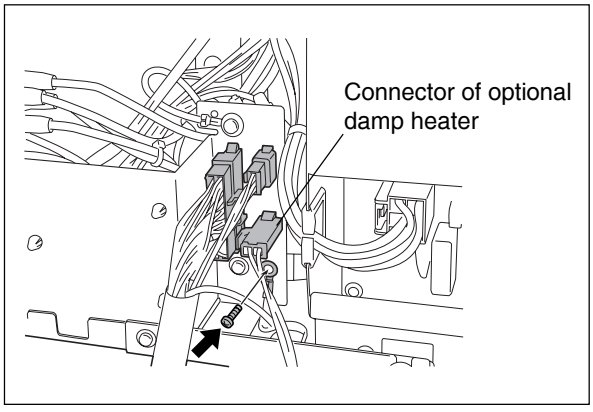


Fig. 2-550

(4) Remove 2 screws and take off 2 fixing brackets on the rear side.

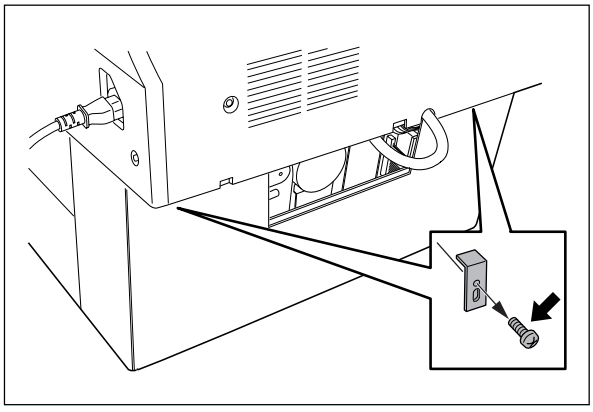


Fig. 2-551

(5) Take off the lower drawer of the equipment and PFP upper drawer.

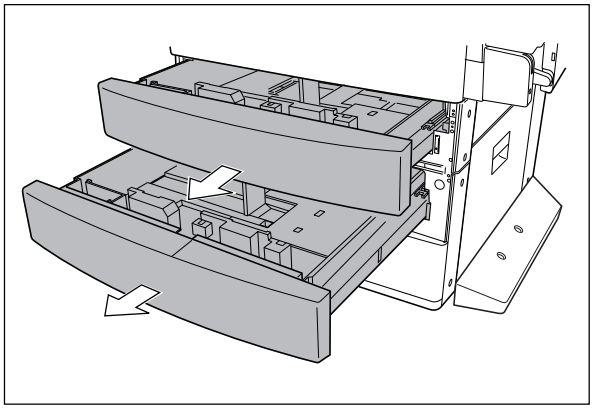


Fig. 2-552

(6) Remove 4 screws and take off 2 fixing brackets on the front side.

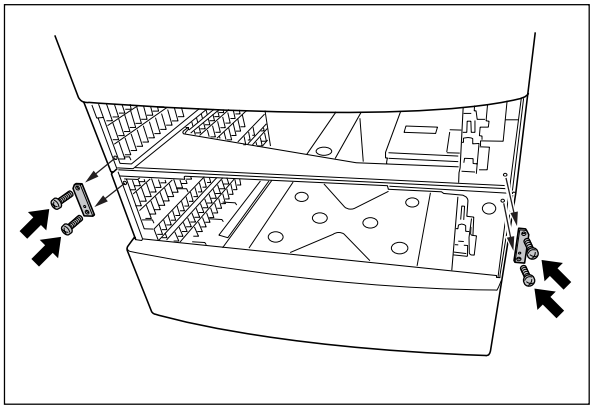


Fig. 2-553

(7) Lift up the equipment and take off the PFP.

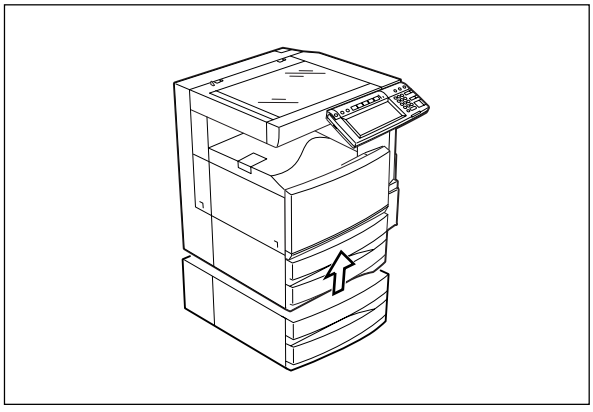


Fig. 2-554

[C] KD-1012 (Large Capacity Feeder (LCF))

(1) Turn OFF the power and unplug the power cable.

(2) Remove 7 screws and take off the rear cover of the equipment.

Note: Disconnect the connectors of the RADF first when the RADF is installed.

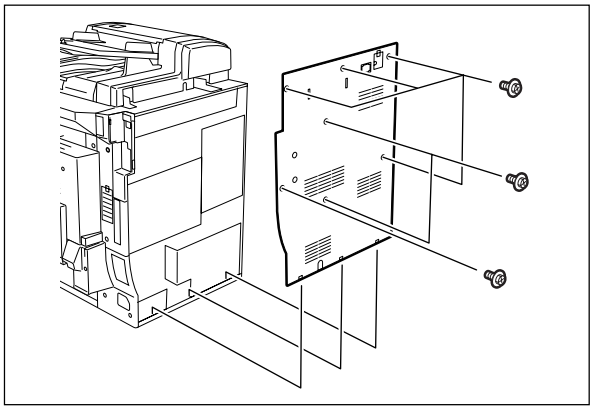


Fig. 2-555

(3) Remove 1 screw and the ground wire, and then disconnect 2 connectors (3 if the optional damp heater is installed).

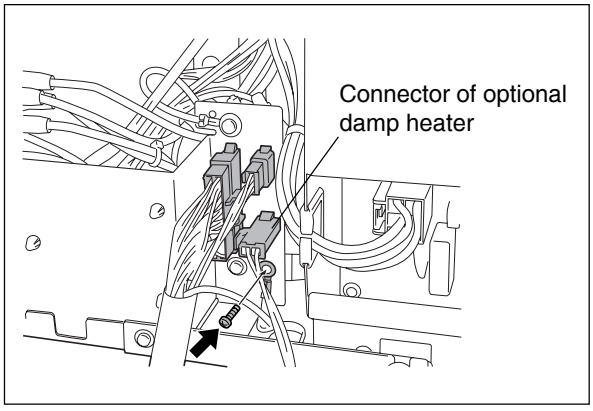


Fig. 2-556

(4) Remove 2 screws and take off 2 fixing brackets on the rear side.

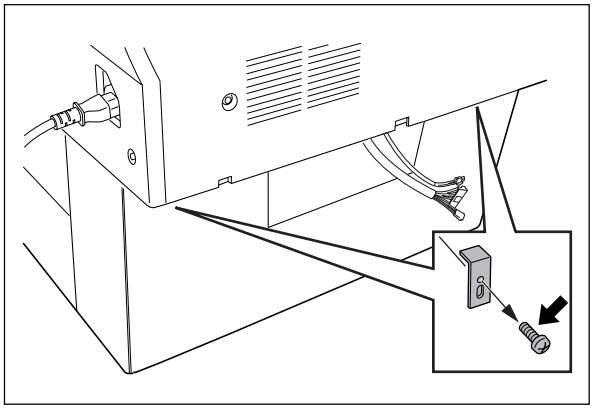


Fig. 2-557

(5) Take off the lower drawer of the equipment.

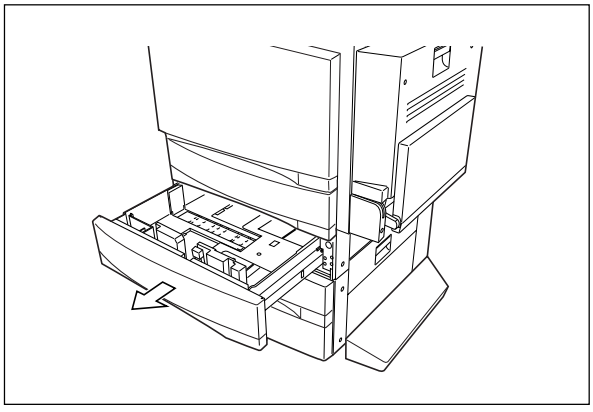


Fig. 2-558

(6) Pull out the LCF drawer.

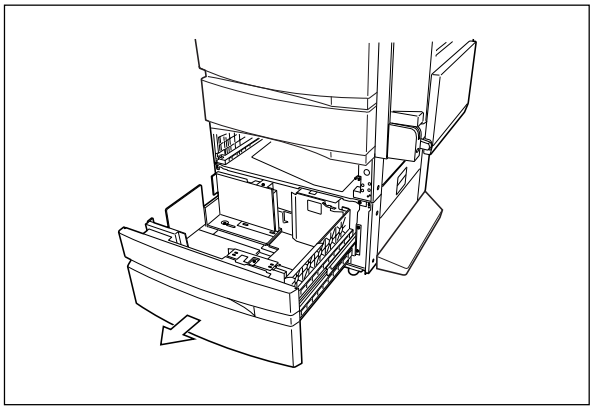


Fig. 2-559

(7) Remove 4 screws and take off 2 fixing brackets on the front side.

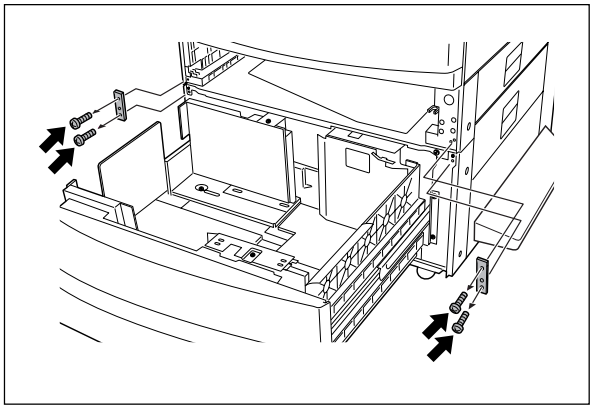


Fig. 2-560

(8) Lift up the equipment and take off the LCF.

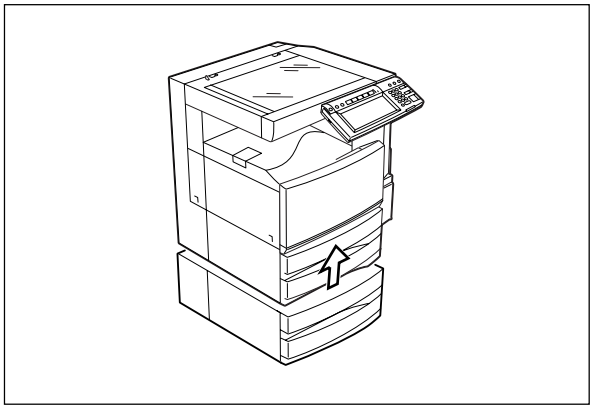


Fig. 2-561

[D] MJ-1022 (Hanging finisher)

<When PFP/LCF is not installed>

(1) Turn OFF the power and unplug the power cable.

(2) Take off the connector cover and disconnect the connector.

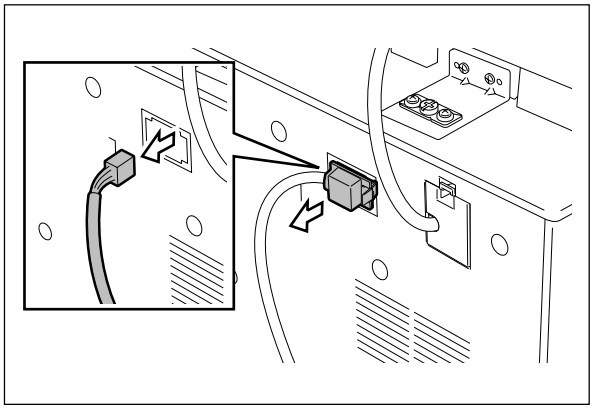


Fig. 2-562

(3) Remove 2 screws and take off the safety bracket on the rear side and the cover.

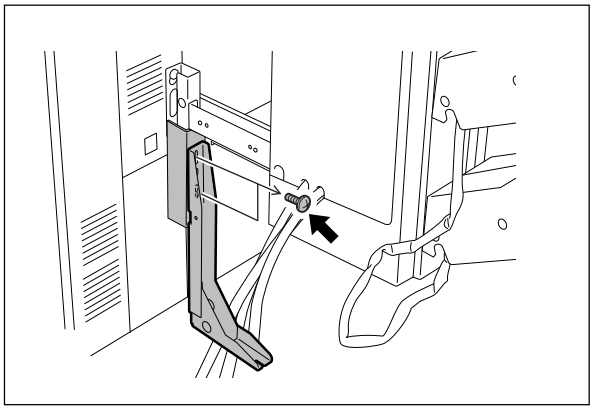


Fig. 2-563

(4) Remove 2 screws and take off the safety bracket on the front side and the cover.

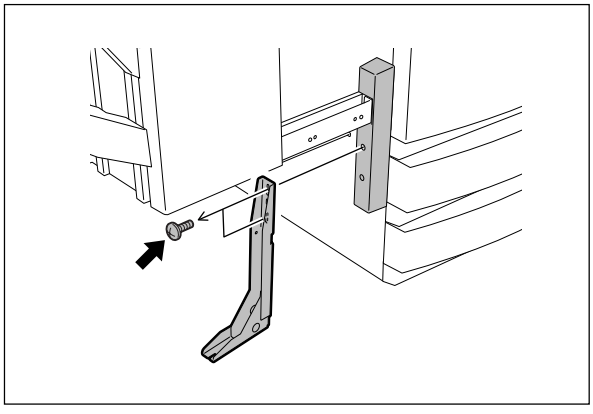


Fig. 2-564

(5) Remove 2 screws.

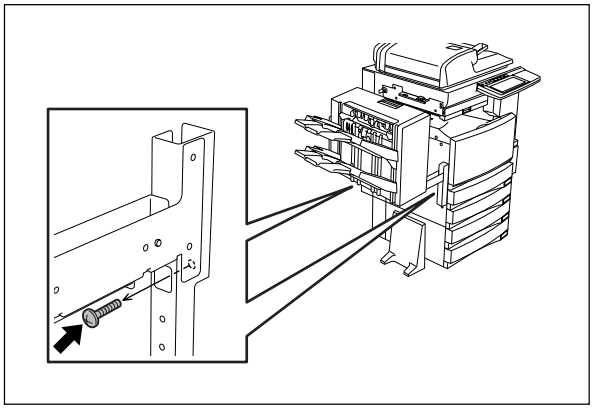


Fig. 2-565

(6) Lift up the finisher and take it off.

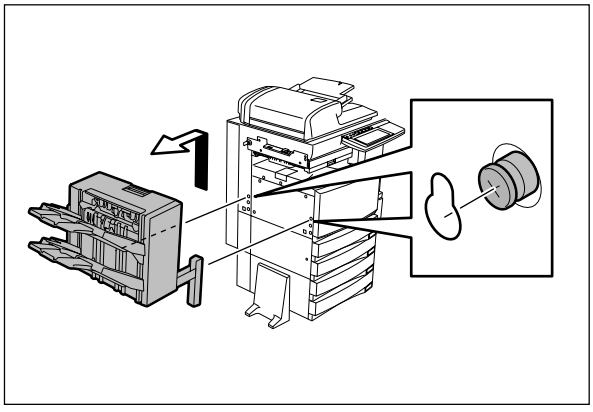


Fig. 2-566

<When PFP/LCF is installed>

(1) Turn OFF the power and unplug the power cable.

(2) Take off the connector cover and disconnect the connector.

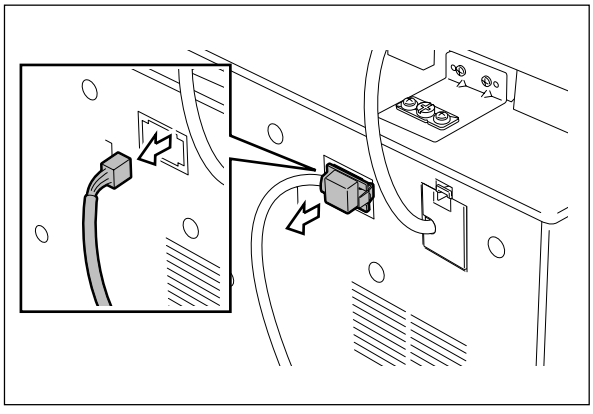


Fig. 2-567

(3) Remove 2 screws and take off the cover on the rear side.

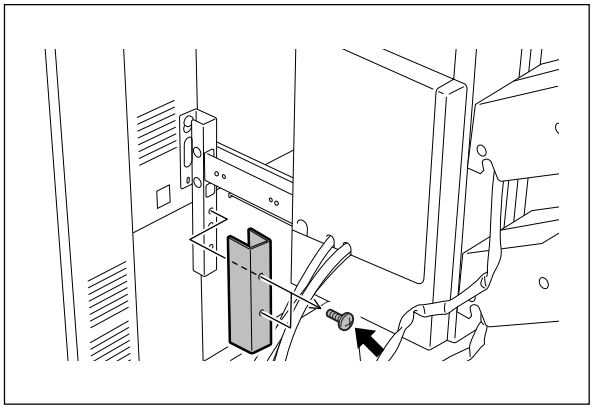


Fig. 2-568

(4) Remove 2 screws and take off the cover on the front side.

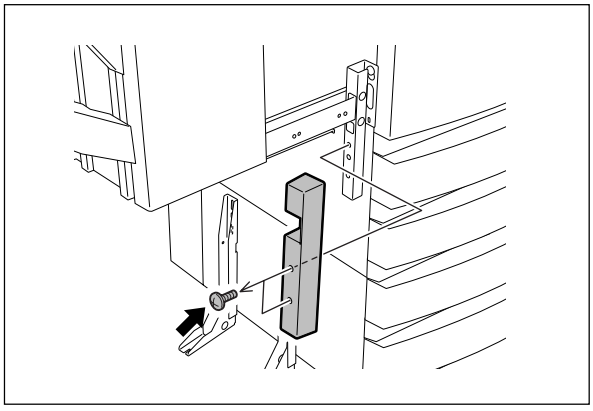


Fig. 2-569

(5) Remove 2 screws.

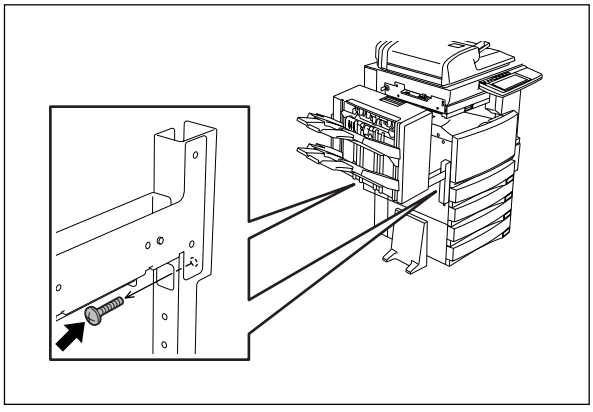


Fig. 2-570

(6) Lift up the finisher and take it off.

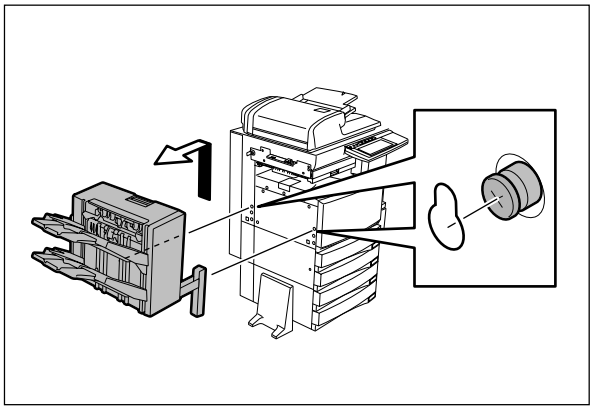


Fig. 2-571

[E] MJ-1023 (Console finisher)

(1) Turn OFF the power and unplug the power cable.

(2) Take off the connector cover and disconnect the connector.

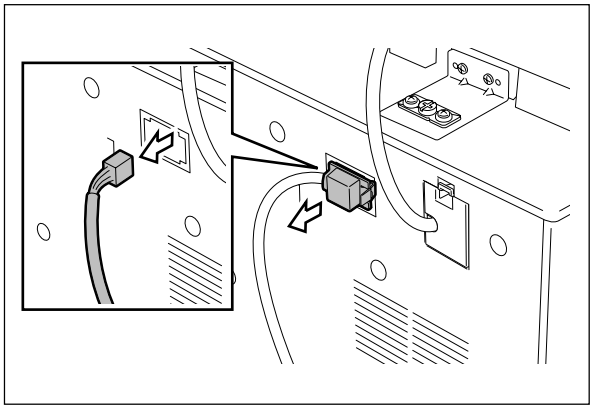


Fig. 2-572

(3) Remove 1 screw and take off the finisher lower cover.

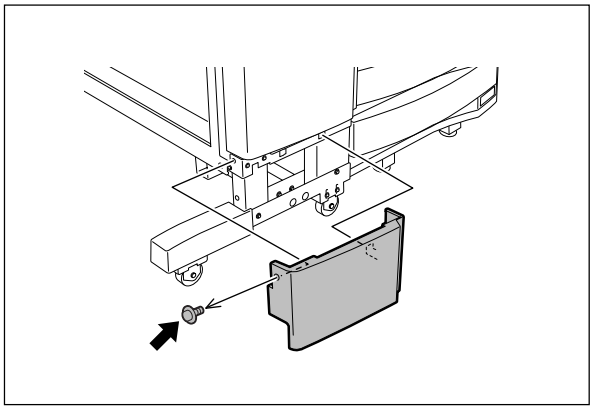


Fig. 2-573

(4) Remove 3 screws and take off the finisher front cover.

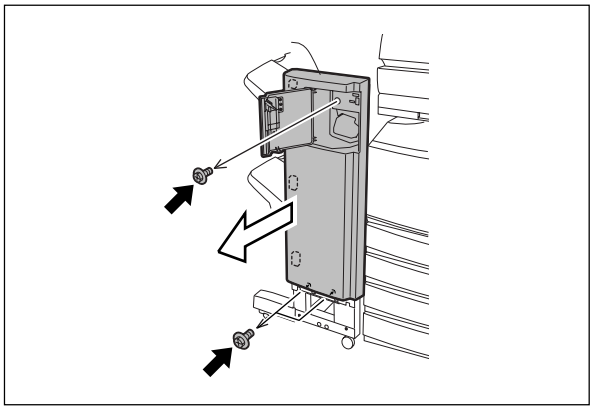


Fig. 2-574

(5) Remove 1 screw.

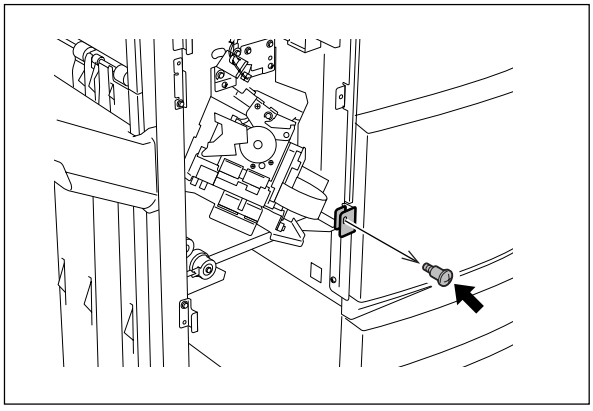


Fig. 2-575

(6) Remove 1 screw and take off the cover of the finisher rear side.

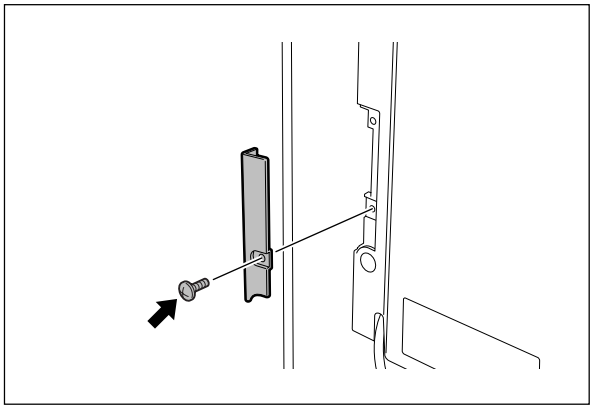


Fig. 2-576

(7) Remove 1 screw.

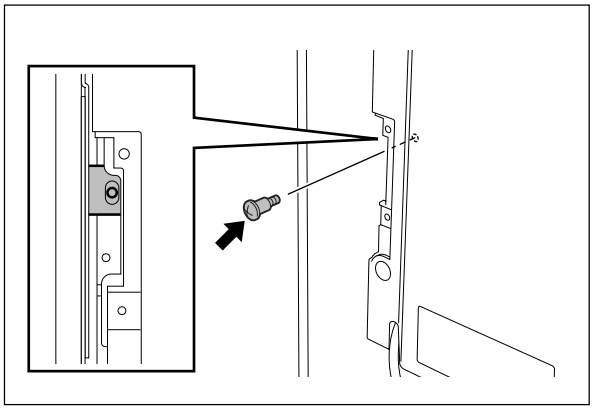


Fig. 2-577

(8) Take off the finisher.

Note: Be careful not to fell the finisher when moving the finisher unit only.

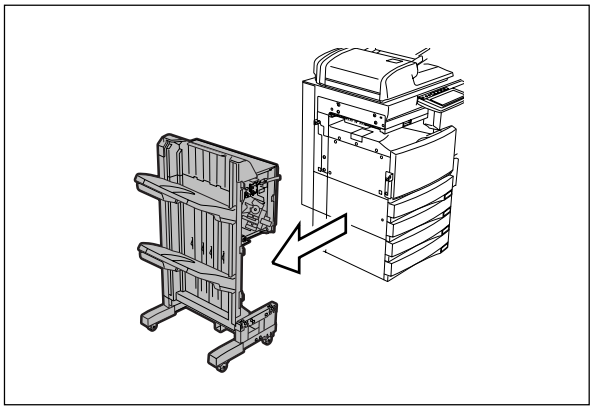


Fig. 2-578

[F] MJ-1024 (Console finisher)

(1) Turn OFF the power and unplug the power cable.

(2) Take off the connector cover and disconnect the connector.

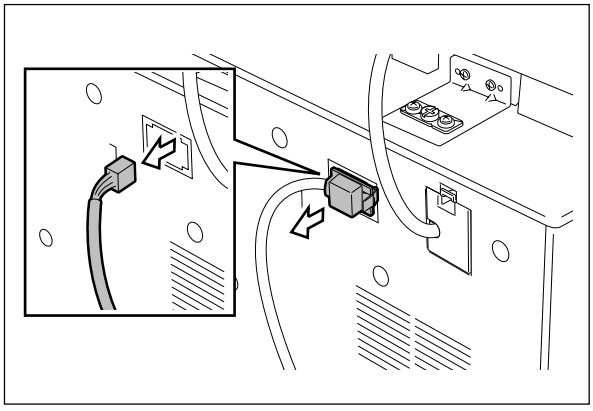


Fig. 2-579

(3) Open the finisher front cover and remove 1 screw.

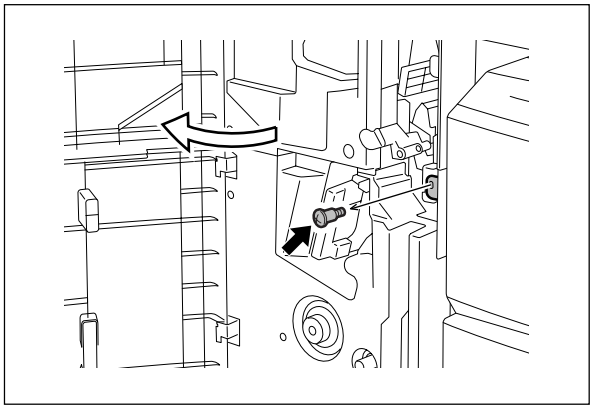


Fig. 2-580

(4) Remove 1 screw and take off the cover of the finisher rear side.

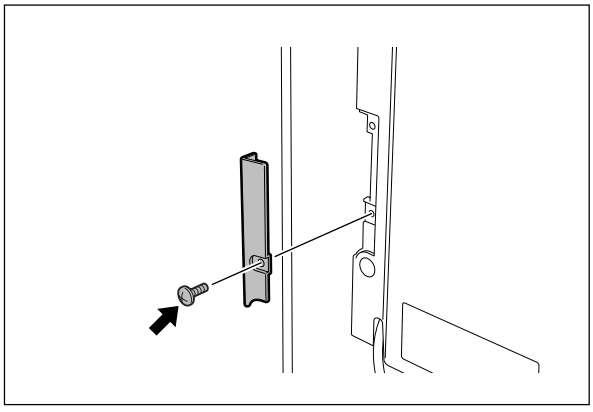


Fig. 2-581

(5) Remove 1 screw.

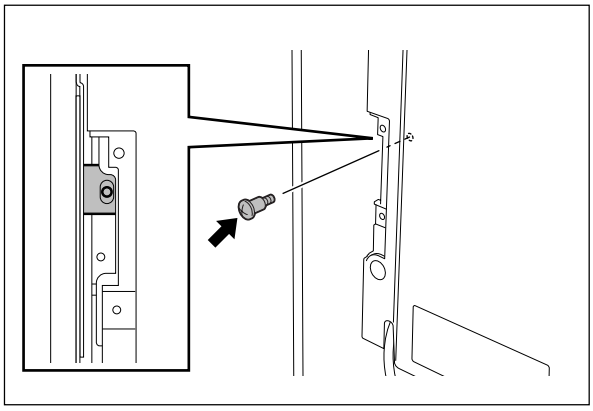


Fig. 2-582

(6) Take off the finisher.

Note: Be careful not to fell the finisher when moving the finisher unit only.

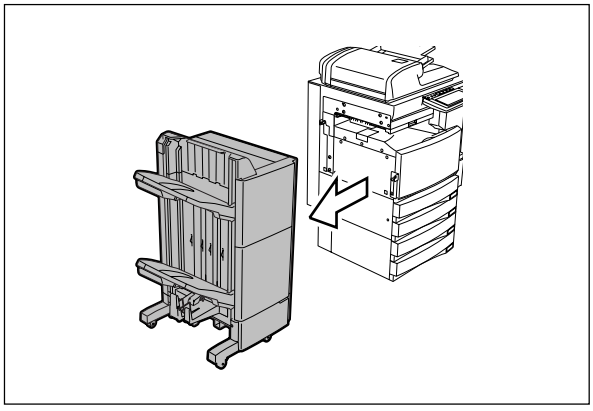


Fig. 2-583

[G] MJ-6004 (Hole punch unit)

(1) Turn OFF the power and unplug the power cable.

(2) Take off the connector cover and disconnect connector.

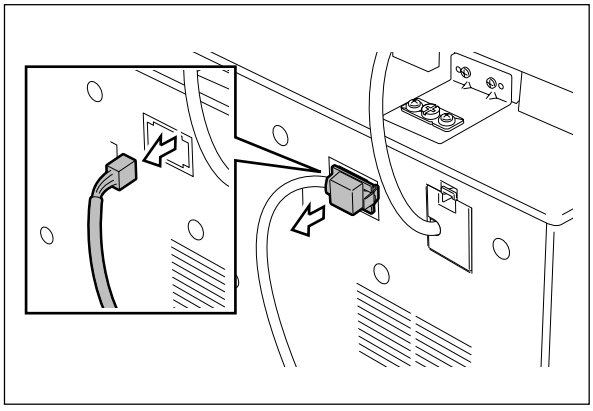


Fig. 2-584

(3) Open the front cover of the hole punch unit and remove 1 screw.

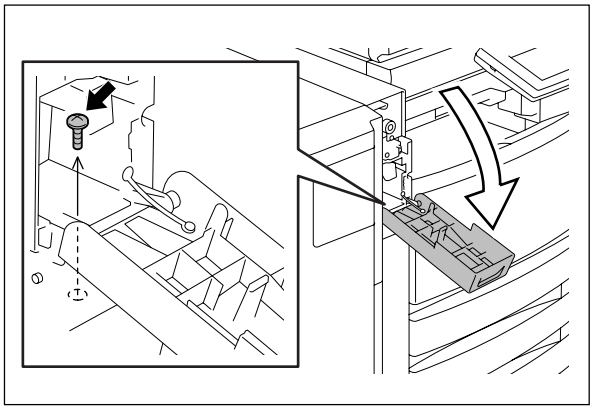


Fig. 2-585

(4) Take off the cover of the punch unit lower side.

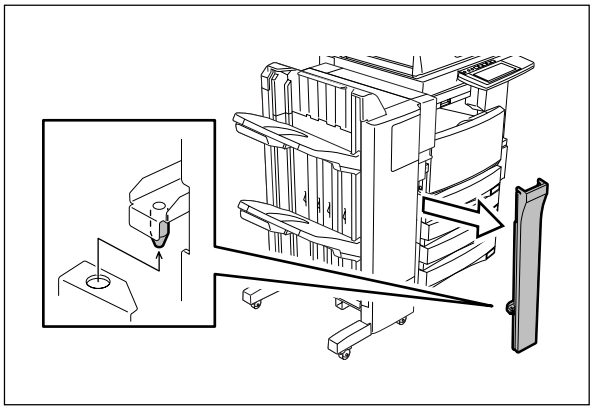


Fig. 2-586

(5) Remove 1 screw.

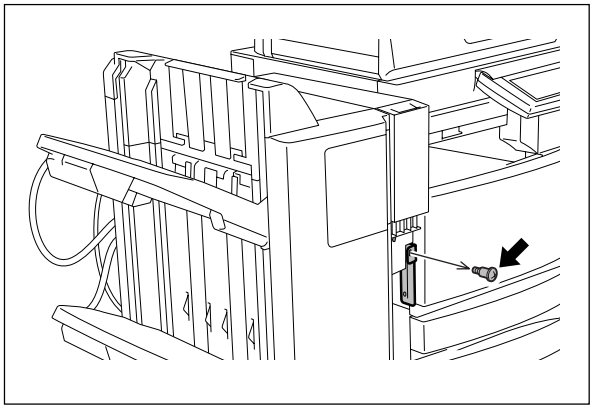


Fig. 2-587

(6) Remove 3 screws and take off the punch unit rear cover.

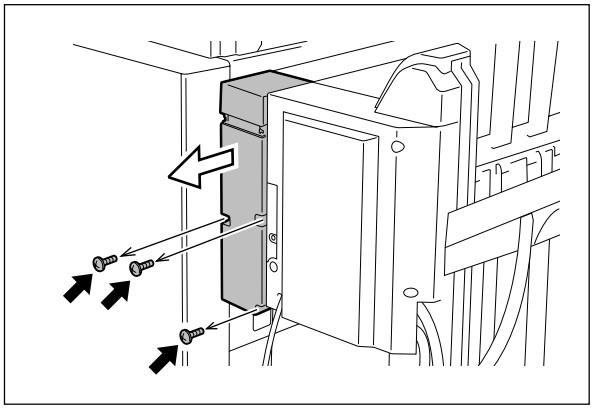


Fig. 2-588

(7) Remove 1 screw.

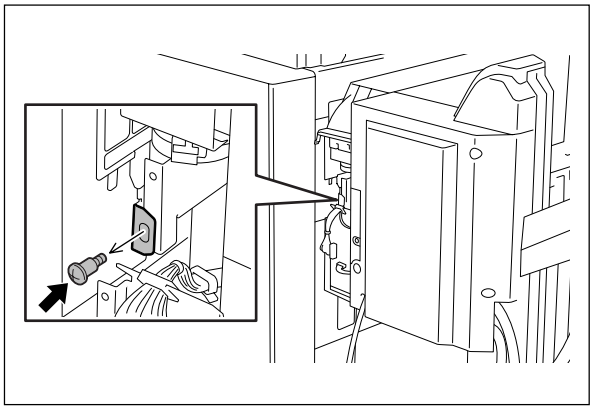


Fig. 2-589

(8) Take off the finisher with the hole punch unit.

Note: Be careful not to fell the finisher when moving the finisher unit only.

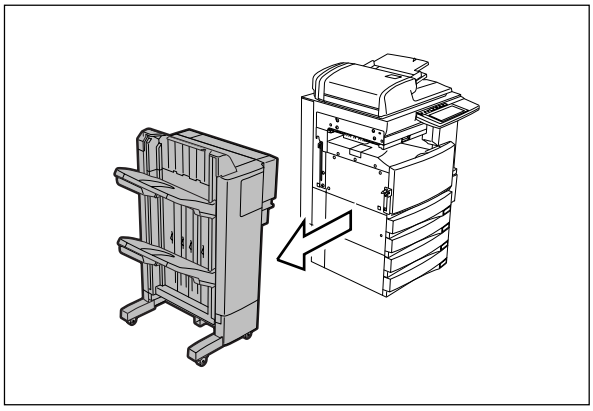


Fig. 2-590

(9) Disconnect 2 connectors.

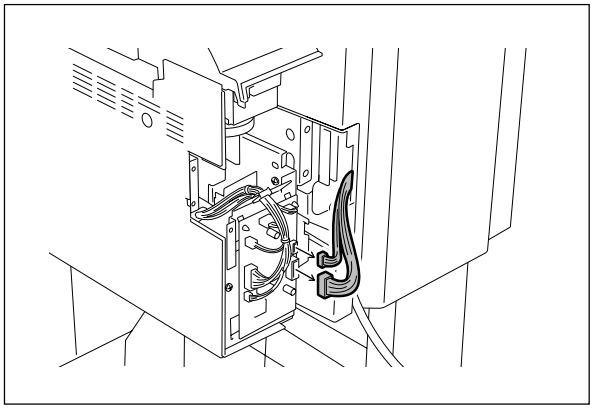


Fig. 2-591

(10) Remove 2 screws.

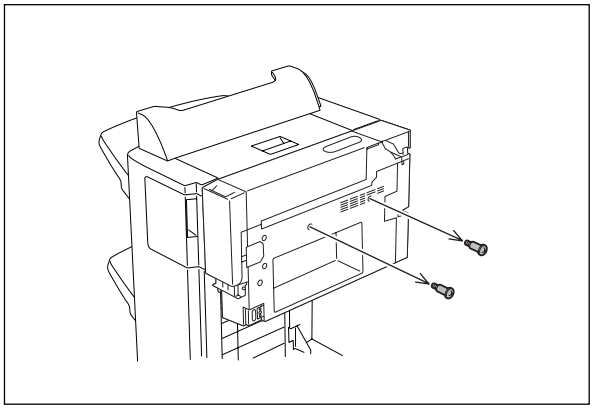


Fig. 2-592

(11) Lift up the punch unit and take it off.

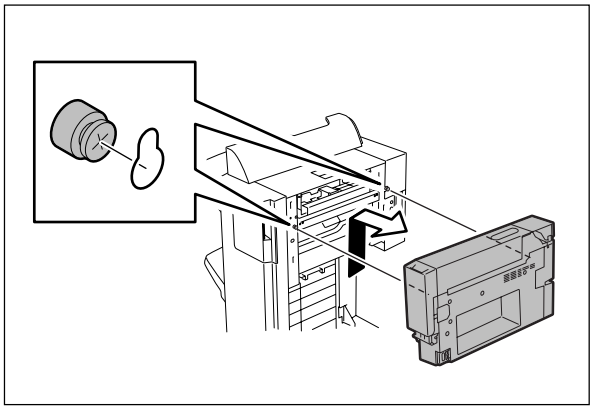


Fig. 2-593

[H] KN-3511 (Bridge unit)

(1) Turn OFF the power and unplug the power cable.

(2) Remove 2 screws and take off the cover.

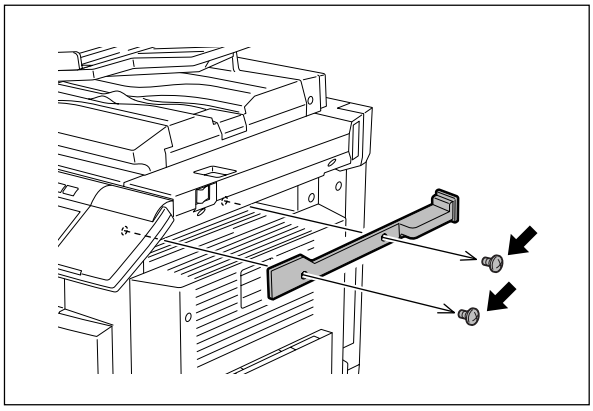


Fig. 2-594

(3) Disconnect 1 connector.

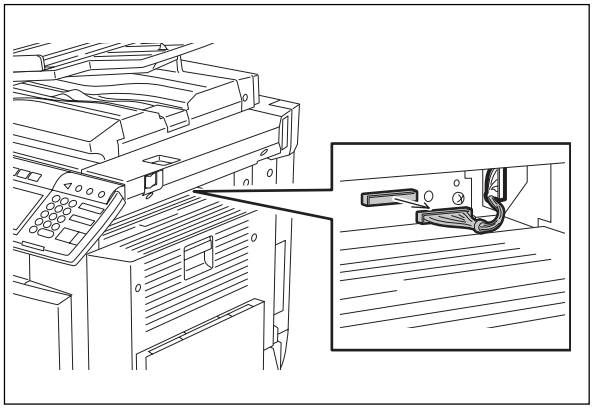


Fig. 2-595

(4) Open the bridge unit. Remove 1 screw and take off the cover.

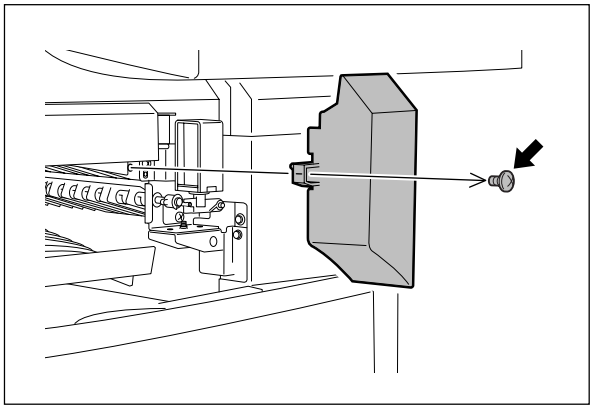


Fig. 2-596

(5) Close the bridge unit and remove 1 screw.

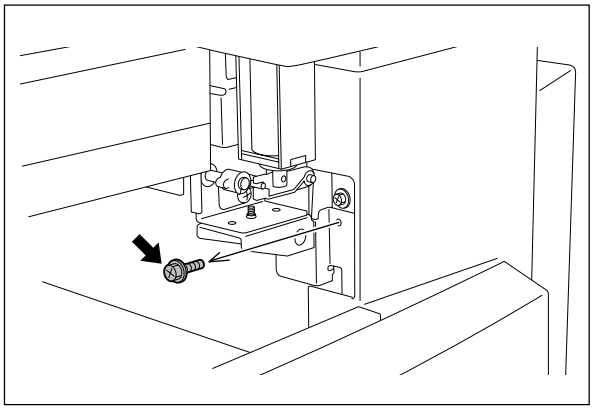


Fig. 2-597

(6) Remove 4 screws and take off the bracket.

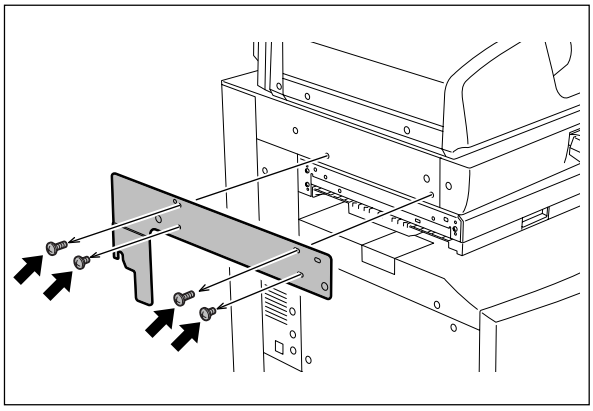


Fig. 2-598

(7) Lift up the bridge unit and release the hook. Take off the bridge unit toward the front.

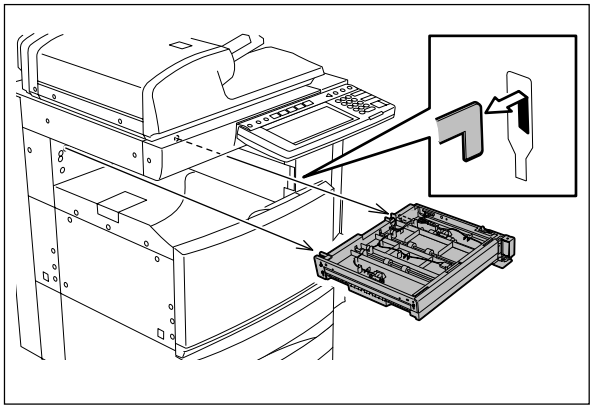


Fig. 2-599

3. COPY PROCESS

3.1 Expression of Colors and 4-Step Copy Process

A variety of colors can be expressed by mixing the three primary colors : Yellow, magenta and cyan. Red can be created by mixing yellow and magenta; blue can be created by mixing magenta and cyan; green is created by mixing cyan and yellow; and mixing all the three primary colors allows you to obtain black.

This equipment has accomplished to improve reproducibility by adding black toner to the mixture of the above three colors at proper ratio.

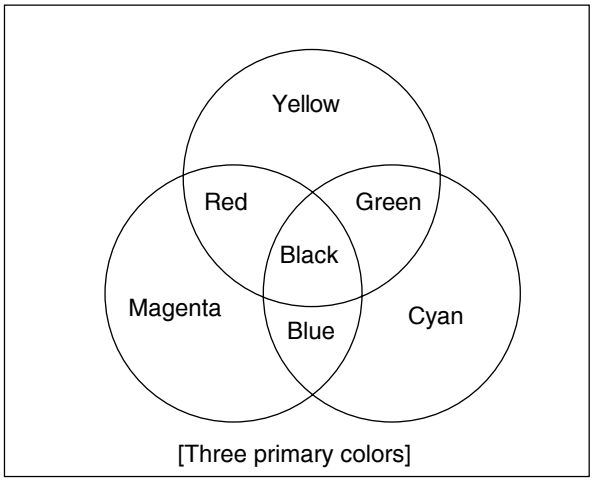


Fig. 3-101

e-STUDIO3511/4511 adopts a revolver mechanism which combines the three developer units of yellow, magenta and cyan. In this process, each image of cyan, magenta and yellow is developed in order by rotating these developers and overlaid on the transfer belt one after another. Then the black image developed by independent black developer unit is overlaid for the best expressions of colors. Four layers of color image (K→ C→ M→ Y) on the transfer belt are transferred onto paper.

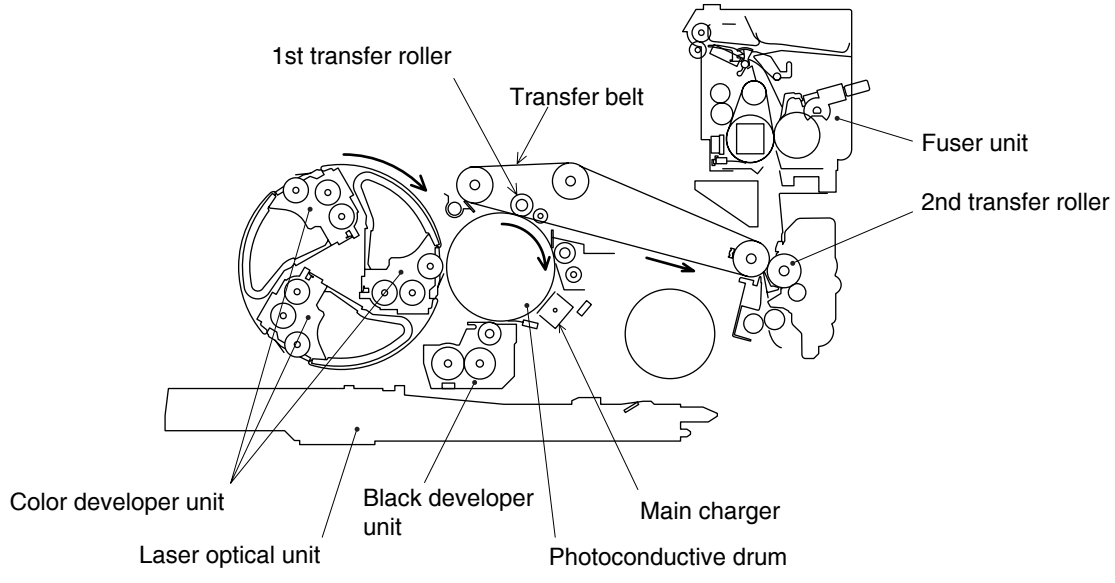


Fig. 3-102

3.2 General Description of Copying Process

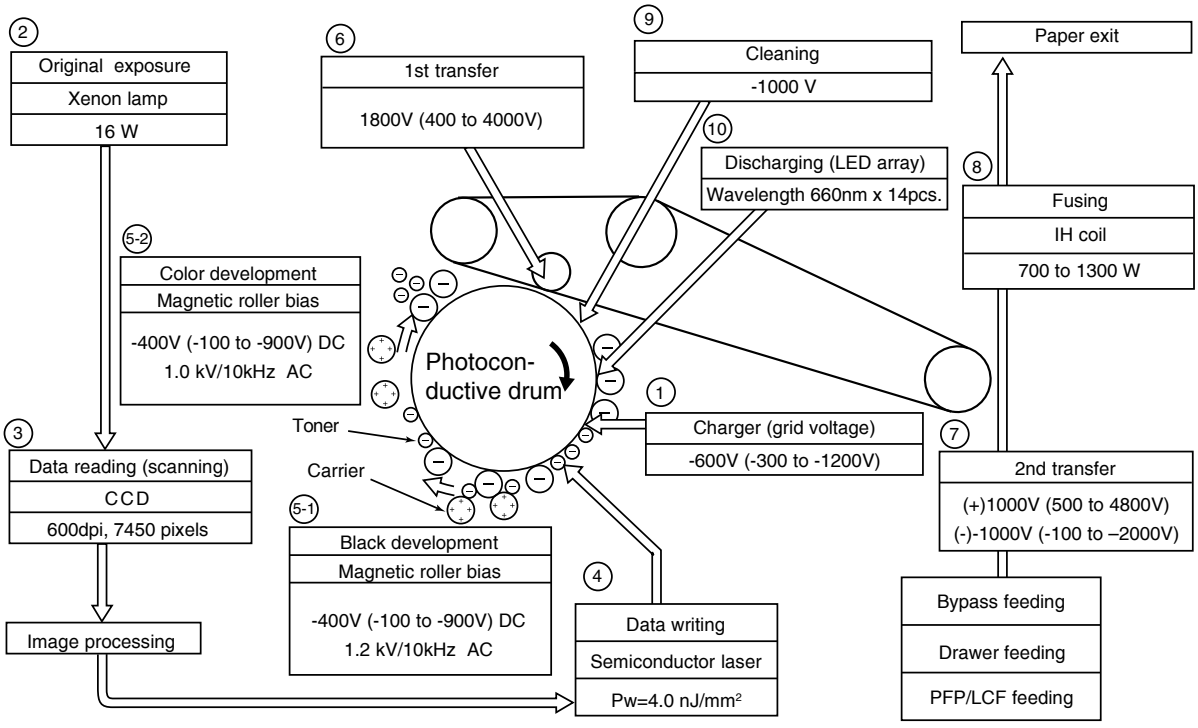


Fig. 3-201

1. Charging: Places a negative charge on the surface of the photoconductive drum.
   ↓
2. Original exposure: Converts images on the original into optical signals.
   ↓
3. Data reading: The optical image signals are read into CCD and converted into electrical signals.
   ↓
4. Data writing: The electrical image signals are changed to light signals (by laser emission) which expose the surface of the photoconductive drum.
   ↓
5. Development: Negatively-charged toner is made to adhere to the photoconductive drum, producing a visible image.
   ↓
6. 1st transfer: Transfers the visible image (toner) on photoconductive drum to the transfer belt.
   ↓
7. 2nd transfer: Transfers the visible image (toner) on the transfer belt to paper.
   ↓
8. Fusing: Fuses the toner image to the paper by applying heat and pressure.
   ↓
9. Blade cleaning : While scraping off the residual toner from the drum by the blade, this blade also eliminates the (+) residual charge on the drum left after image transfer.
   ↓
10. Discharging: Eliminates the residual (–) charge from the surface of the photoconductive drum.

3.3 Details of Copying Process

(1) Photoconductive drum

The photoconductive drum consists of two layers. The outer layer is a photoconductive layer made of an organic photoconductive carrier (OPC), and the inner layer is an aluminum conductive base in a cylindrical form.

The photoconductive carrier has a special property: when it is exposed to light, the electrical resistance it possesses increases or decreases with the strength of the light.

Example:

· Strong incident light→
  Decreases resistance (works as a conductor.)

· Weak incident light→
  Increases resistance (works as an insulator.)

[Formation of electrostatic latent images]

In the processes of charging, data reading, data writing, and discharging described below, the areas on the drum corresponding to colored areas on the original are deprived of negative charge, while the areas on the drum corresponding to white areas retain the negative charge. Thus it forms a negative charge image on the drum surface.

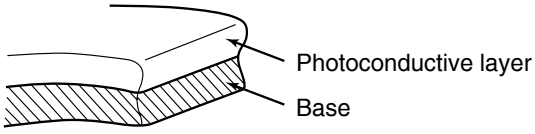
As this negative charge image on the drum is not visible to the human eye, it is called an "electrostatic latent image."

(2) Charging

Charging is a process to apply charge evenly to the drum surface.

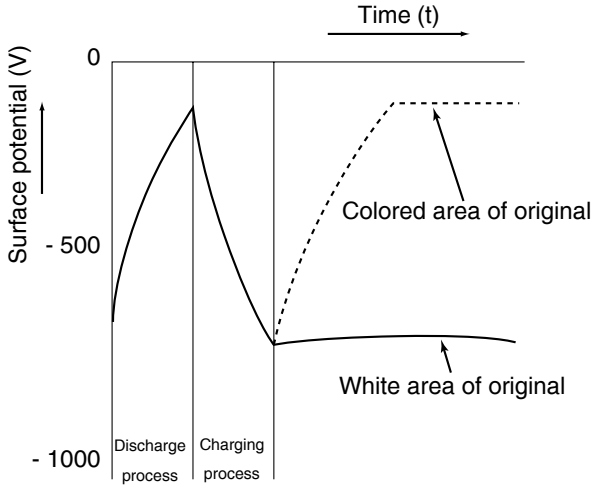
The charger wire produces negative corona discharge, which is controlled by the grid so that the drum surface is evenly charged with negative potential.

The surface potential on the drum is determined by the grid potential and is controlled to a fixed value by the grid control circuit.



Structure of the photoconductive drum
(Example of OPC)

Fig. 3-301



Electric potential of the photoconductive drum

Fig. 3-302

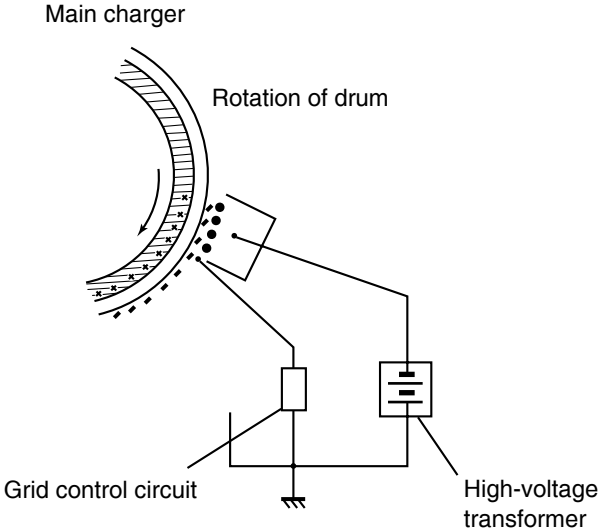


Fig. 3-303

(3) Data reading (scanning)

Data reading is a process of illuminating the original with light and converting the reflected light into electrical signals.

The light reflected from the original is directed to the Charge Coupled Device (CCD) and this optical image information is converted to electrical signals (image signals), which are then transmitted to the image processing section via the scanner control PC board.

The CCD for color processing has RGB filters provided over its surface, which allow the CCD to read the light amount in the respective ranges of wavelength. The image data corresponding to the respective RGB colors is then transmitted to the image processing section.

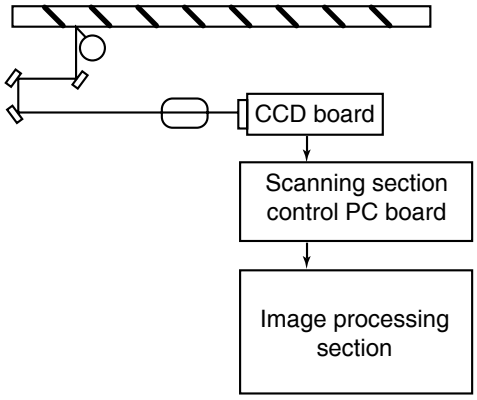
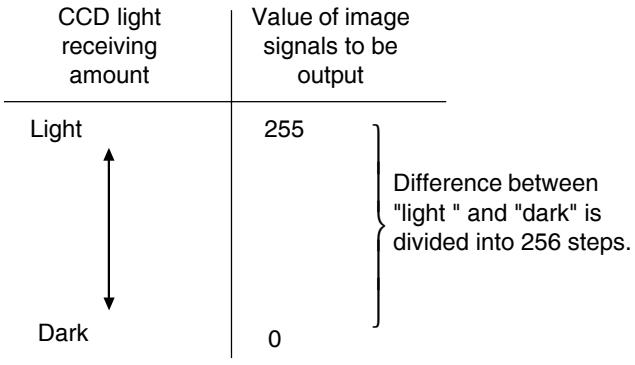


Fig. 3-304

(Example)



(4) Data writing

Data writing is a process of converting the image signals transmitted from the image processing section into light signals and exposing the drum surface with the light signal.

Namely, the image signals transmitted from the image processing section are converted into optical signals (laser emission) by the semiconductor laser element, which are then used to expose the drum surface, thus forming an electrostatic latent image there.

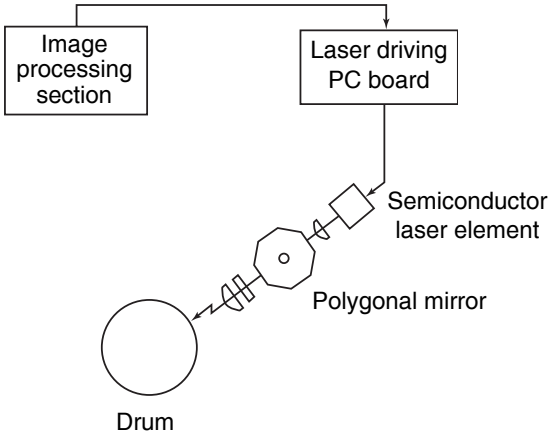


Fig. 3-305

(5) Development

Development is a process of making the electrostatic latent images visible to the eye (visible image).

Developer material is supplied to the photoconductive drum surface by means of a magnetic roller, allowing the toner in the developer material to adhere to the areas on the drum surface where the potential is lower than the developer bias which is applied to the magnetic roller (reverse development).

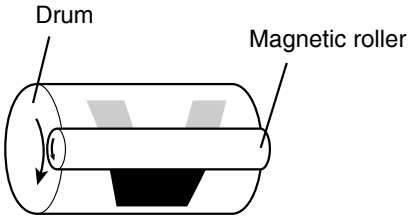


Fig. 3-306

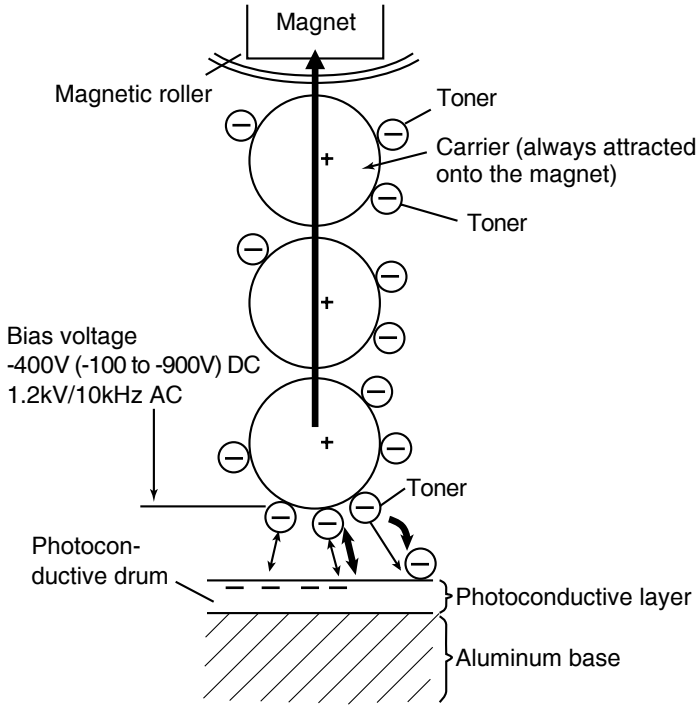


Fig. 3-307

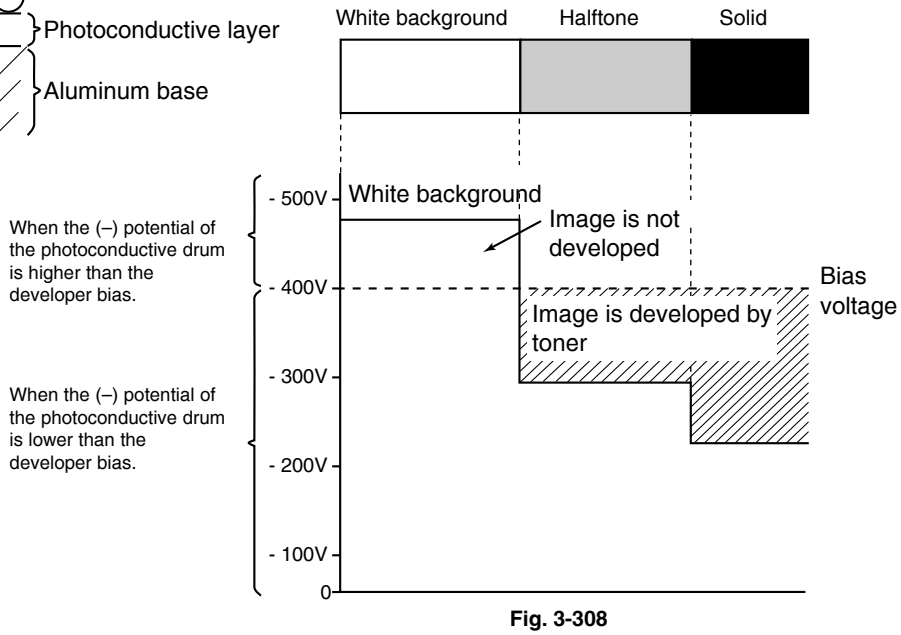


Fig. 3-308

• About developer material

The developer material is comprised of a mixture of toner and carrier. The toner is charged to a negative polarity and the carrier to a positive polarity, due to the friction with each other caused by mixing.

Toner : Mainly consists of resin and coloring.

Carrier: Consists of ferrite, and over its surface resin coating to provide consistent frictional electrification.

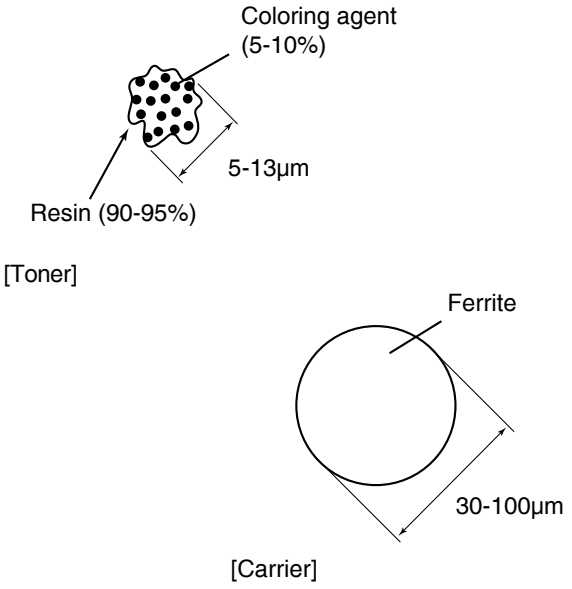


Fig. 3-309

Note:

If the developer material is used for a long period of time (beyond its normal life span), toner will become caked onto the carrier.

↓

The performance of the carrier is lowered.

Result: 1. Image density is lowered.
2. Toner scattering occurs.
3. Background fogging occurs.

Solution: Replace the developer material.

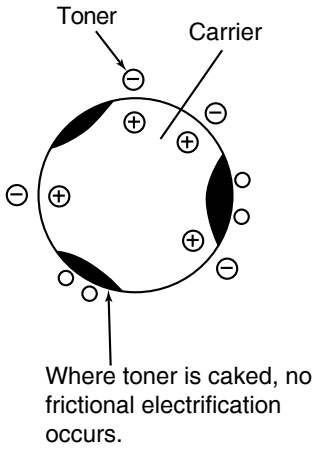


Fig. 3-310

• Magnetic roller

- Magnetic brush development technique -

Inside magnetic rollers, the south and north poles are arranged as shown in the right figure. The developer material forms a brush-like fluff which contacts the photoconductive drum surface.

↓

This is caused by the lines of magnetic force between the south and north poles.

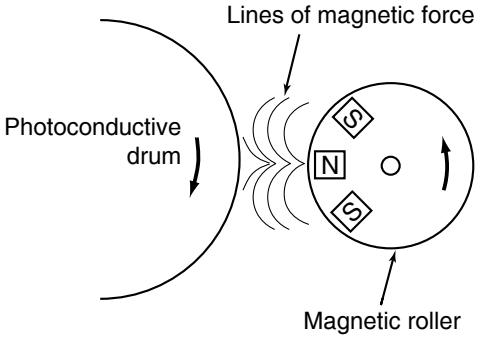


Fig. 3-311

(6) 1st transfer

- 1st transfer is a process of transcribing the toner image (visible image) formed on the photoconductive drum to the transfer belt. A positive bias is applied to the transfer roller, causing the transfer belt to be positively charged. This in turn helps to form an electric field E between the transfer belt (positive) and the photoconductive layer of the photoconductive drum (grounded), thus making the toner image transferred to the transfer belt. In the copy process of this equipment, images are transferred in the order of K→C→M→Y on the transfer belt.

(7) 2nd transfer

- An electrostatic attracting force occurs between the polarized charge (negative) on the lower surface of transfer belt and the belt itself (positive). That makes the toner being absorbed from the belt to the paper. Then an electric field is formed between the 2nd transfer roller and the transfer belt drive roller, which generates a paper polarization and thus the toner is transferred from the belt to the paper.

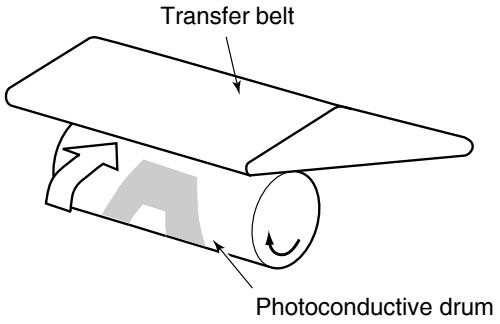


Fig. 3-312

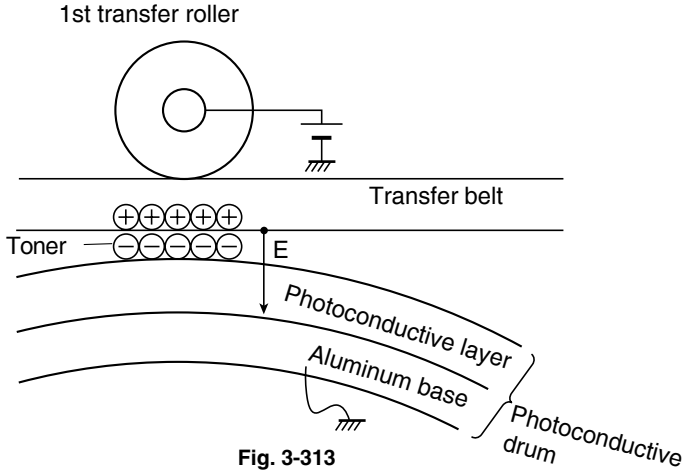


Fig. 3-313

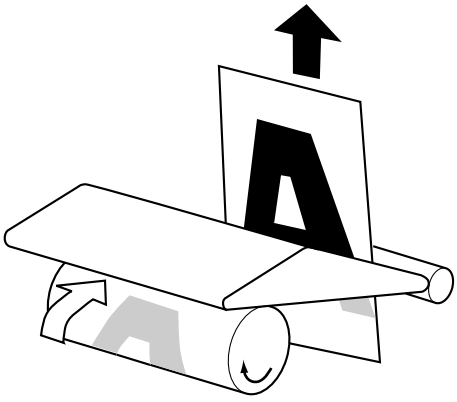


Fig. 3-314

(8) Fusing process

Fusing is a process of melting the toner on the paper and fixing it firmly onto the paper.

Method : The softening point of the toner (main component : resin) is 105 - 120°C.

↓

(Heat) Toner is melted by the fuser belt.

+

(Pressure) The fuser belt is pressed against the pressure roller by the springs to increase adherence of the melted toner to the paper.

↓

The paper is subjected to the heat and pressure when passing through the fuser belt and the pressure roller.

‖

(Fusing) The toner on the paper is fused to it.

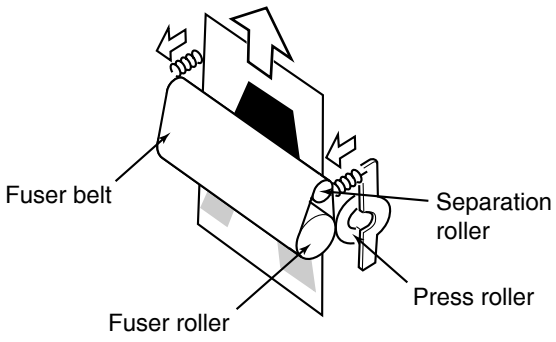


Fig. 3-315

(9) Blade cleaning

While eliminating the (+) charge on the photoconductive drum applied during the transfer stage, the conductive blade recovers the toner left on the drum at the same time.

- Elimination of transfer charge
  With this OPC photoconductive drum, (+) charge on their surface cannot be eliminated optically. Therefore, (–) voltage is applied to the conductive blade, which is pressed against the drum, to eliminate the (+) charge applied at the transfer process.

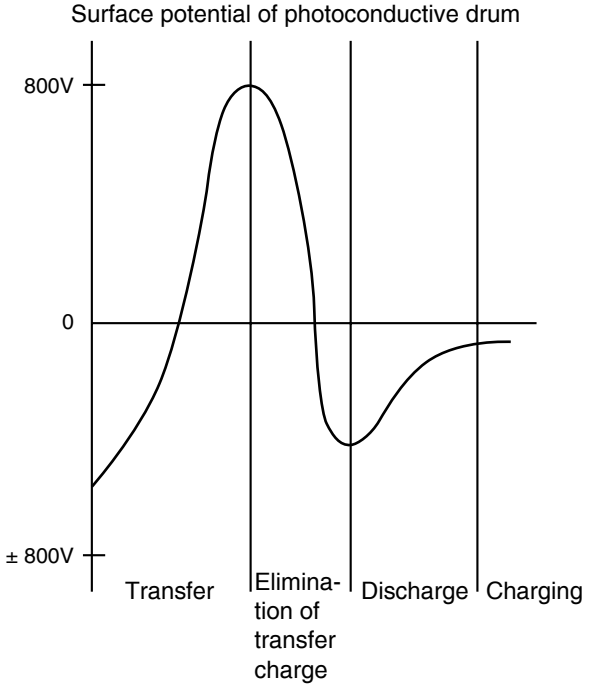


Fig. 3-316

• Cleaning

The edge of the conductive blade is pressed against the photoconductive drum surface to scrape off residual toner. The toner removed is then caught by the recovery blade.

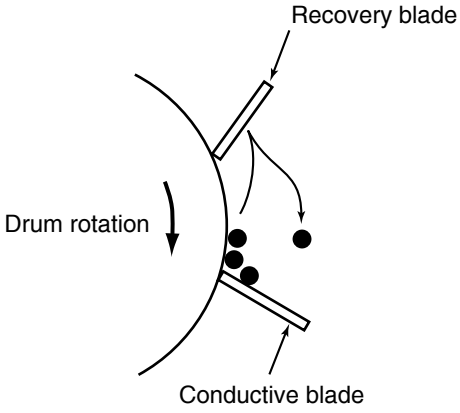


Fig. 3-317

(10) Discharging process

Discharging is a process of eliminating the (–) charge remaining on the photoconductive drum before the next charging process.

If the charge remaining on the photoconductive drum is not eliminated, the following phenomenon would occur:

(–) charge remaining on the photoconductive drum surface causes uneven application of the charge for the next copying.

↓

The next copy obtains a double image. (The preceding image remains.)

To prevent this :

The entire surface of the photoconductive drum is flooded with light by the discharge LED array.

↓

The photoconductive drum becomes electrically conductive.

↓

All of the (–) charge remaining on the photoconductive drum is conducted away to ground (However, (+) charge is eliminated by the conductive blade as mentioned in (8)).

↓

Preparation for the next copying process is completed.

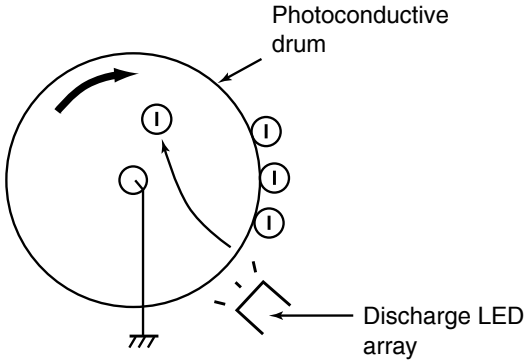


Fig. 3-318

3.4 List of Copying Process Conditions

Process	FC-210/310	e-STUDIO3511/4511
1. Photoconductive drum (1) Sensitivity	OD-FC31 (OPC drum) (1) Sensitized drum (ø30)	OD-3511 (OPC drum) (1) Highly sensitized drum (ø90)
2. Charging	Scorotron type -250 to -1000 V (grid voltage) (adjusting by image quality control)	Scorotron type -300 to -1200 V (grid voltage) (adjusting by image quality control)
3. Data writing (1) Light source (2) Light amount	 (1) Semiconductor laser (adjustment not required) (2) 6.0 nJ/mm^2	 (1) Same as FC-210/310 (2) 4.0nJ/mm^2
4. Image control	Image quality control by detecting toner adhesion amount	Same as FC-210/310
5. Development (1) Magnetic roller (2) Auto-toner detection (3) Toner supply (4) Toner-empty detection (5) Toner (6) Developer material (7) Developer bias	 (1) One magnetic roller (2) Magnetic bridge-circuit method (3) Toner cartridge replacing method (4) Density detection method (5) T-FC31-K (black) T-FC31E-K (black) T-FC31-Y (yellow) T-FC31E-Y (yellow) T-FC31-M (magenta) T-FC31E-M (magenta) T-FC31-C (cyan) T-FC31E-C (cyan) (6) D-FC31-K (black) D-FC31-Y (yellow) D-FC31-M (magenta) D-FC31-C (cyan) (7) DC -100 to -700 V (adjusting by image quality control) AC 1.2 kV/4 kHz	(1) Same as FC-210/310 (2) Black: Magnetic bridge-circuit method Color: Optical reflection sensor method (3) Same as FC-210/310 (4) Same as FC-210/310 (5) T-3511-K (black) T-3511*-K (black) T-3511-Y (yellow) T-3511*-Y (yellow) T-3511-M (magenta) T-3511*-M (magenta) T-3511-C (cyan) T-3511*-C (cyan) (Marked*: E, D, C and T) (6) D-3511-K (black) D-3511-Y (yellow) D-3511-M (magenta) D-3511-C (cyan) (7) DC -100 to -900 V (adjusting by image quality control) Color: AC 1.0 kV/10 kHz Black: AC 1.2 kV/10 kHz
6. Transfer	Transfer belt method	(1) 1st transfer: Transfer belt method (2) 2nd transfer: Transfer roller method
7. Separation	Separation by electrostatic attraction of the transfer belt	Self-separation by transfer belt and 2nd transfer roller

Process	FC-210/310	e-STUDIO3511/4511
8. Photoconductive drum cleaning		
(1) Method	(1) Blade cleaning	(1) Same as FC-210/310
(2) Recovered toner	(2) Non-reusable	(2) Same as FC-210/310
(3) Transfer charge removal	(3) Simultaneous cleaning and discharging by the conductive blade	(3) Same as FC-210/310
9. Transfer belt cleaning	-	Blade cleaning (contact/release mechanism)
10. Discharge	LED array (red)	Same as FC-210/310
11. Fusing		
(1) Method	(1) Belt fusing system • Upper heat roller: Fluorinated aluminum roller (ø30) (Lamp rating: 550W) • Fuser roller: Silicon sponge roller (ø38) • Lower heat roller: PFA tube roller (ø40) (Lamp rating: 450 W) • Fuser belt: PFA tube belt (ø70)	(1) Belt fusing system • Fuser roller : Fluorinated iron roller (ø40) (IH coil: 700 -1300W) • Pressure roller: Silicon sponge roller (Surface - PFA tube) • Fuser belt: PFA tube belt (ø60) • Separation roller: Ceramic roller (ø20)
(2) Cleaning	(2) Oil roller method • Oil roller (ø22) • Cleaning roller (ø21)	(2) Oil roller method • Oil roller (ø18) • Cleaning roller (ø16)
(3) Heat roller temperature	(3) ON/OFF control by thermistor (upper/lower roller independent temperature control)	(3) ON/OFF control and power control by thermistor
(4) Heater	(4) Halogen lamp	(4) IH coil

4. GENERAL OPERATION

4.1 Overview of Operation

- Operation of equipment
  - Operation during initializing, pre-running and ready
  - Copying operation
    - Drawer feed copying by the [START] button
    - Bypass feed copying
    - Interrupt copying

4.2 Description of Operation

4.2.1 Warming-up

(1) Initialization
- Power ON
- IH coil ON
- Set number “1”, reproduction ratio “100%” and “Wait Warming Up” are displayed.
- Fan motors ON
- Initialization of laser optical system
  - The polygonal motor rotates in low speed.
- Initialization of feeding system
  - Each drawer tray goes up.
- Pre-running operation is stopped after five seconds.
- Cleaning of transfer belt
  - Main motor is turned ON.
- Initialization of revolver motor
  - Detects home position.
  - Rotates the developer unit to the waiting position and stops rotating.

  (- Performs image quality control.)*1
- Initialization of scanning system
  - The carriage moves to the home position.
  - The carriage moves to the peak detection position.
  - The exposure lamp is turned ON.
  - Peak detection (white color is detected by the shading correction plate)
  - The exposure lamp is turned OFF.
- “READY (WARMING UP)” is displayed.

(2) Pre-running operation

Pre-running operation is started when the temperature of the fuser belt surface reaches a certain temperature.
- Transport motor is turned ON.
  - Fuser roller rotation.

(3) When the temperature of the fuser belt surface becomes sufficient for fusing,
- “READY” is displayed.

*1: Image quality control should be performed only at change of environment or periodical performing timing.

4.2.2 Ready (ready for copying)

- Buttons on the control panel enabled
- When no button is pressed for a certain period of time,
  - Set number “1” and reproduction ratio “100%” are displayed. Equipment returns to the normal ready state.

4

4.2.3 Drawer feed copying (Upper drawer paper feeding)

(1) Press the [START] button ON

- “READY” changes to “COPYING”
- Exposure lamp turned ON
- Scan motor turned ON → Carriages-1 and -2 move forward
- Main motor, transport motor, developer motor and exit motor turned ON
  - Drum, fuser unit, developer unit and exit roller are driven
- Drum cleaner brush motor turned ON

(2) Drawer paper feeding

- Fans rotated in high speed and upper drawer feed clutch turned ON
  - Pickup roller, feed roller, separation roller and transport roller start to rotate
- Paper reaches the upper drawer feed sensor
  -Upper drawer feed sensor is turned ON
- Paper reaches the registration roller
  - Registration sensor is turned ON and aligning is performed
- Upper drawer feed clutch is turned OFF after a certain period of time

(3) A certain period of time passed after the carriage operation

- Registration clutch is turned ON after a certain period of time → Paper is transported to the transfer area
- Copy counter operates

(4) Completion of scanning

- Scan motor turned OFF
- Exposure lamp turned OFF
- Registration clutch turned OFF (after the trailing edge of the paper passed the registration roller)
- “READY (PRINTING)” is displayed

(5) Printing operation

1) Color printing operation

- Black developer lifting clutch, black developer bias (+150), transfer belt cleaner clutch, toner recovery auger, drum cleaner brush, discharge LED and cleaning blade bias turned ON
- Transfer belt cleaner auger motor turned ON
  - Transfer belt used toner auger is driven
- Main charger and 1st transfer bias turned ON
- Transfer belt marker detection

- Black developer lifting clutch, black developer bias (-) turned ON
  - Contact the black developer roller to the drum surface
- Laser emission (black image)
- Black developer drive clutch and black developer bias (AC) turned ON
- 1st transfer (black image)
  - Black image is transferred to the transfer belt
- Black developer bias (AC) turned OFF
- Black developer lifting clutch turned ON and black developer drive clutch turned OFF
  - Release the black developer roller from the drum surface
- Black developer bias (-) turned OFF
- Revolver motor turned ON
  - Revolver rotates 65 degrees to move to cyan developing position
- Transfer belt marker detection
- Laser emission (cyan image)
- Color developer bias (AC) and color developer bias (-) turned ON
- Color developer drive clutch turned ON
- Transfer belt cleaner clutch and transfer belt cleaner auger motor turned OFF
- 1st transfer (cyan image)
  - Cyan image is transferred to the transfer belt
- Color developer bias (AC), color developer drive clutch and color developer bias (-) turned OFF
- Revolver motor turned ON
  - Revolver rotates 120 degrees to move to magenta developing position
- Transfer belt marker detection
- Laser emission (magenta image)
- Color developer bias (AC), color developer drive clutch and color developer bias (-) turned ON
- 1st transfer (magenta image)
  - Magenta image is transferred to the transfer belt
- Color developer bias (AC), color developer drive clutch and color developer bias (-) turned OFF
- Revolver motor turned ON
  - Revolver rotates 120 degrees to move to yellow developing position
- Transfer belt marker detection
- Laser emission (yellow image)
- Color developer bias (AC), color developer drive clutch and color developer bias (-) turned ON
- 1st transfer (yellow image)
  - Yellow image is transferred to the transfer belt
- Color developer drive clutch, color developer bias (AC) and color developer bias (-) turned OFF
- Revolver motor turned ON
  - Revolver rotates 55 degrees to move to escape position
- Transfer belt marker detection
- 2nd transfer roller contact clutch and 2nd transfer bias turned ON
  - Contact the 2nd transfer roller to the transfer belt
  - The image on the transfer belt is transferred to the paper
- Transfer belt cleaner clutch and transfer belt cleaner auger motor turned ON
- 2nd transfer roller contact clutch and 2nd transfer bias turned OFF

- Transfer belt cleaner clutch and transfer belt cleaner auger motor turned OFF
- Main charger and 1st transfer bias turned OFF

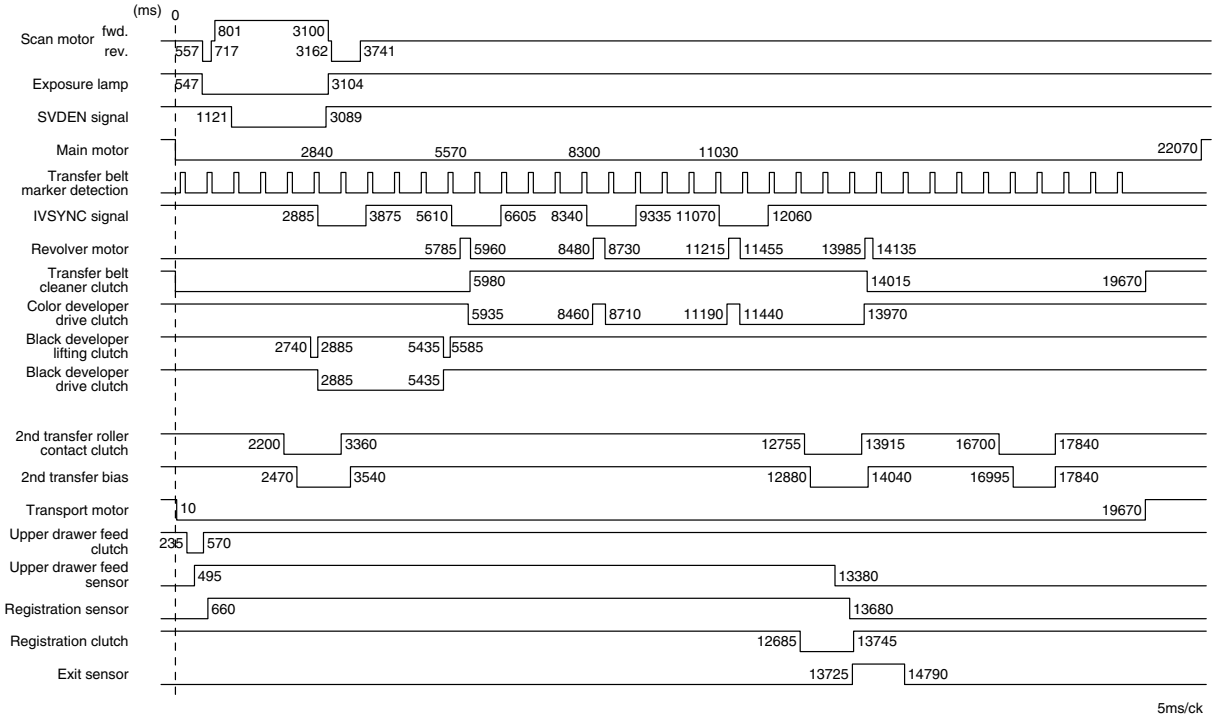
2) Black printing operation

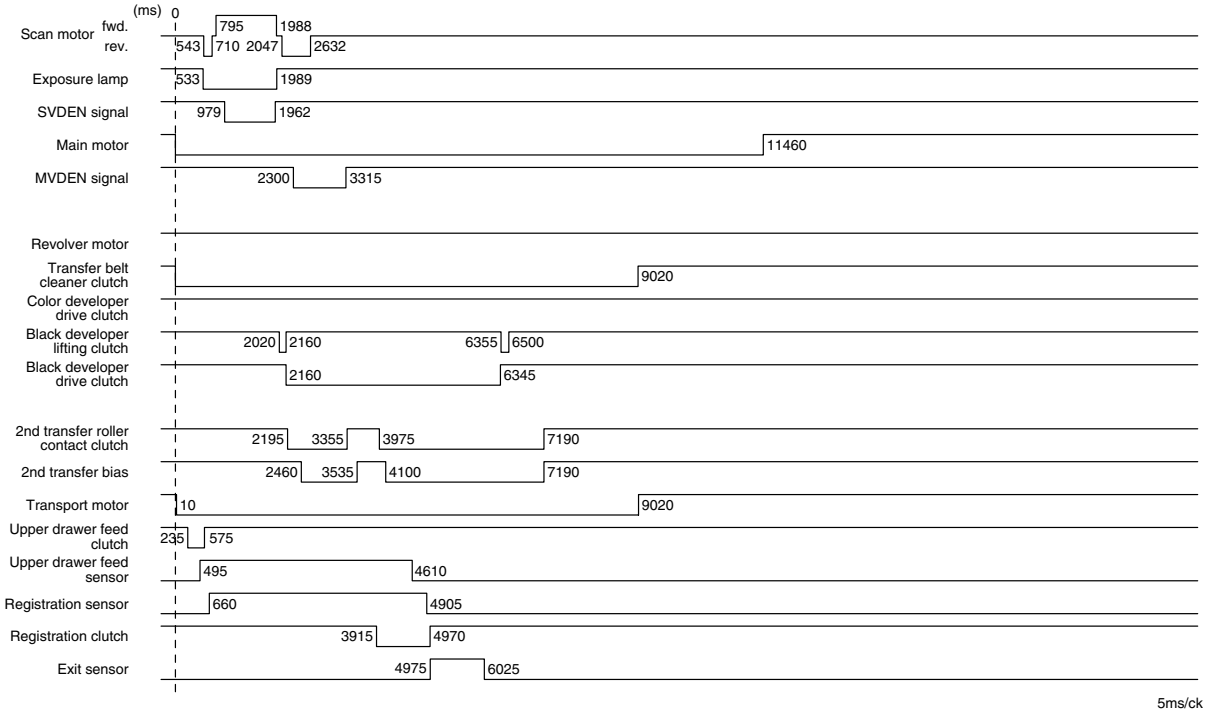
- Black developer lifting clutch, black developer bias (+150), transfer belt cleaner clutch, toner recovery auger, drum cleaner brush, discharge LED and cleaning blade bias turned ON
- Transfer belt cleaner auger motor turned ON
  - Transfer belt used toner auger is driven
- Main charger and 1st transfer bias turned ON
- Black developer lifting clutch and black developer bias (-) turned ON
  - Contact the black developer roller to the drum surface
- Laser emission (black image)
- Black developer drive clutch and black developer bias (AC) turned ON
- 1st transfer (black image)
  - Black image is transferred to the transfer belt
- 2nd transfer roller contact clutch and 2nd transfer bias turned ON
  - Contact the 2nd transfer roller to the transfer belt
  - The image on the transfer belt is transferred to the paper
- Black developer bias (AC) turned OFF
- Black developer lifting clutch turned ON and black developer drive clutch turned OFF
  - Release the black developer roller from the drum surface
- Black developer bias (-) turned OFF
- Main charger turned OFF
- 2nd transfer roller contact clutch and 2nd transfer bias turned OFF
- Transfer belt cleaner clutch, transfer belt cleaner auger motor and 1st transfer bias turned OFF

(6) Paper exiting

- The exit sensor detects the trailing edge of the paper
- Toner recovery auger, drum cleaner brush, discharge LED and cleaning blade bias turned OFF
- Main motor, transport motor, developer motor and exit motor turned OFF
- Drum cleaner brush motor turned OFF
- Drum, fuser unit and developer unit are stopped
  Fans return to rotate at the normal rotation speed
- “READY” is displayed and the equipment enters into ready mode

Timing chart for copying (A4/LT size, 1 sheet from upper drawer)





4.2.4 Bypass feed copying

(1) Insert a paper into the bypass tray.
- Bypass paper sensor is turned ON.
  - "Ready for bypass feeding" is displayed.
- Carriages move to the home position.

4

(2) Press the [START] button ON
- "Ready for bypass feeding" changes to "COPYING".
- Exposure lamp ON
- Scan motor ON → Carriages-1 and -2 move forward.
- Main motor, transport motor, developer motor and exit motor turned ON
  - The drum, fuser unit, developer unit and exit roller are driven.
- Drum cleaner brush motor turned ON.

(3) Bypass feeding
- Fans rotate in high speed.
- Bypass feed clutch turned ON.
  - The bypass pickup roller is lowered.
  - The bypass pickup roller, feed roller and separation roller start to rotate.
- Aligning operation
- Paper reaches the registration roller.
- After a certain period of time, the bypass feed clutch turned OFF.

(4) Hereafter, operations (3) through (6) of "4.2.3. Drawer feed copying" are repeated.

4.2.5 Interruption copying

(1) Press the [INTERRUPT] button
- LED "INTERRUPT" is turned ON.
- Copying operation in progress is temporarily stopped, and the carriages-1 and -2 return to appropriate positions.
- "Job interrupted job 1 saved" is displayed.
- Automatic density and reproduction ratio 100% are set. Set number remains the same.

(2) Select the desired copy condition

(3) After interruption copying is finished:
- "Press interrupt to resume job 1" is displayed.
- LED "INTERRUPT" is turned OFF by pressing the [INTERRUPT] button, and the equipment returns to the status before the interruption.
- "Ready to resume job 1" is displayed.

(4) Press the [START] button
The copying operation before the interruption is resumed.

4.3 Detection of Abnormality

When something abnormal has occurred in the equipment, symbols corresponding to the type of abnormality are displayed.

4.3.1 Types of abnormality

A) Abnormality cleared without turning OFF the door switch
   (1) Add paper
   (2) Paper misfeed in bypass
B) Abnormality not cleared without turning OFF the door switch
   (1) Misfeed in equipment
   (2) Add toner
   (3) Developer unit not installed properly
   (4) Toner bag replacement
C) Abnormality not cleared without turning OFF the main switch
   (1) Call for service

4.3.2 Description of abnormality

A-1) Add paper

[In case of the equipment drawer or PFP drawer] (When drawer is not installed)

Drawer not detected

⇩

Drawer is not installed:
Drawer is installed but there is no paper in it: → No paper

↓

A signal sent to the control circuit

↓

Drawer area of the illustration blinks
(When the drawer is selected)

↓

[START] button is disabled.

[In case of the equipment, PFP or LCF drawers] (When drawer is installed)

Based on the combination of the tray-up motor movement and the status of tray-up sensor and empty sensor, CPU detects the presence of paper.

- When the power is turned ON or LCF drawer is inserted (When the power is turned ON or equipment/PFP drawers are inserted).
  LCF performs initialization.
  ↓
  Detects the presence of paper
  Tray-up motor ON - The tray goes up
  At this time, the tray-up sensor and LCF empty sensor are OFF.
  → When the tray-up sensor is not turned ON in a fixed period of time it means that the tray is in abnormal condition
  "Add paper" is displayed regardless of presence/absence of paper
  ↓
  Cleared by turning the power ON/OFF

  → Tray-up sensor is turned ON in a fixed period of time.
  - The tray motor stops.
  At this time, if the empty sensor is ON - It is judged that there is paper.
  OFF - It is judged that there is no paper.
  ↓
  Drawer area of the illustration blinks.
  (When the drawer is selected)

- When the paper in the drawer gets short during copying,
  → The tray-up sensor turned OFF
  → The tray-up motor turned ON - Tray goes up
  → Tray-up sensor turned ON
  → Tray-up motor stopped

- Empty sensor turned OFF during the copying in spite of the tray-up sensor is ON
  ⇩
  It is judged that there is no paper.
  ↓
  Drawer area of the illustration blinks.
  (When the drawer is selected)
  ↓
  The copying operation is stopped.

A-2) Bypass misfeeding ( )

- During bypass feeding

  Bypass feed clutch is turned ON
  ↓
  Registration sensor is turned ON

  * Registration sensor is not turned ON in a fixed period of time (E120)
  ↓
  Bypass misfeeding
  ↓
  Bypass misfeed symbol is displayed ( )
  ↓
  The copying operation is disabled.
  ↓

  Solution: The bypass sensor is turned OFF by removing the paper from the bypass tray.

A-3) Set key copy counter

- When the key copy counter (optional) is pulled out from the equipment which installs it: “Set key copy counter” displayed.
  ↓
  Copying operation disabled

- When the counter is pulled out during copying:
  Copying is stopped when the key copy counter is pulled out.

B-1) Misfeed in equipment ( )

- Exit sensor detects jamming of the leading edge of paper
  Registration clutch turned ON
  ↓ Approx 1.2 sec.*
  Exit sensor turned ON
  If the exit sensor is not turned ON after approx 1.2 seconds,
  ↓
  Paper jam (E010) → The copying operation is stopped.

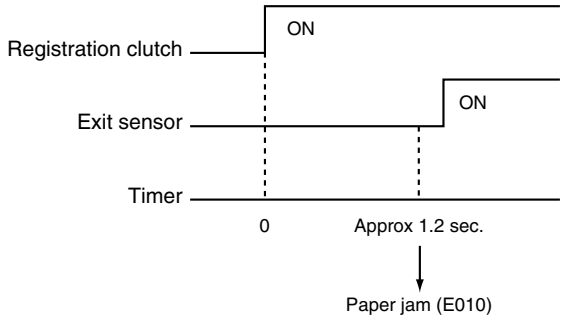


Fig. 4-301

- Exit sensor detects jamming of the trailing edge of paper
  Registration clutch turned OFF
  ↓ Approx 1.3 sec*
  Exit sensor turned OFF
  If the exit sensor is not turned OFF after approx 1.3 seconds,
  ↓
  Paper jam (E020) → The copying operation is stopped.

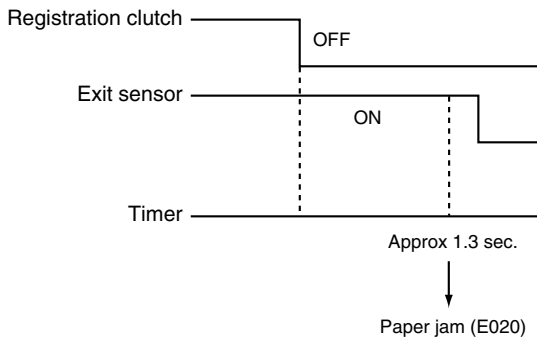


Fig. 4-302

- Immediately after the power ON
  ↓
  Any of all sensors on paper transport path detects paper (ON)
  ↓
  Paper jam (E030)

- Front cover is opened during copying
  ↓
  Paper jam (E410)

- Registration sensor detects jamming of the leading edge of paper:
  The registration sensor is not turned ON in a fixed period of time after the leading edge of paper passed the transport roller.
  ↓
  Paper jam (E120, E200, E210, E300, E330 and E3C0)

- During paper feeding from ADU:
  The registration sensor is not turned ON in a fixed period of time after the ADU clutch is turned ON.
  ↓
  Paper jam (E110)

- During paper transporting from ADU:
  ADU entrance/exit sensors do not detect the paper at the fixed timing
  ↓
  Paper jam (E510 and E520)

- During paper feeding from the equipment or PFP:
  The registration sensor is not turned ON in a fixed period of time after the feed clutch is turned ON.
  ↓
  Paper jam (E220, E310, E320, E340 to E360, E3D0 and E3E0: Error code defers depending on the paper source.)

B-2) Add toner ( )

Toner density becomes low

↓

Auto-toner sensor detects the absence of the toner

↓

Control circuit → “Add toner” is displayed: the copying operation disabled

Solution: Open the front cover and replace the toner cartridge with new one.

Toner is supplied → copying operation enabled

B-3) Developer unit not installed properly

Disconnection of the connectors of the developer unit

↓

“Developer unit not installed” is displayed.

Solution: Connect the connectors of the developer unit and close the front cover.

B-4) Toner bag replacement ( )

- Toner bag is full of used toner

  ↓

  Toner recovery auger shifts to the rear side: Toner bag full detection sensor-1 ON

  ↓

  “Dispose of used toner” is displayed

- Toner bag full detection sensor is turned ON during printing

  ↓

  Printing is stopped after the paper being printed is exited

  Solution: Replace the toner bag with new one and close the front cover.

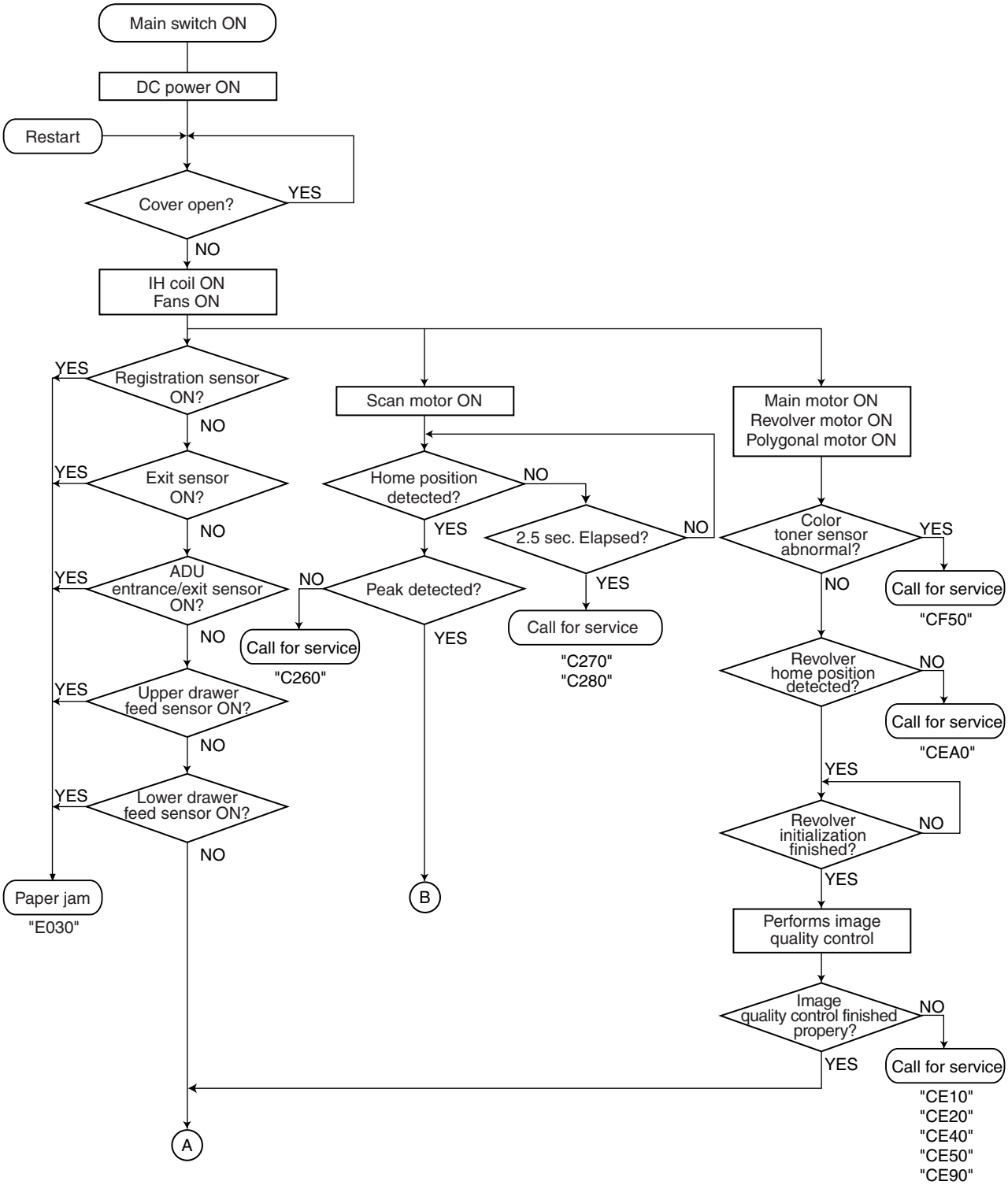
C-1) Call for service

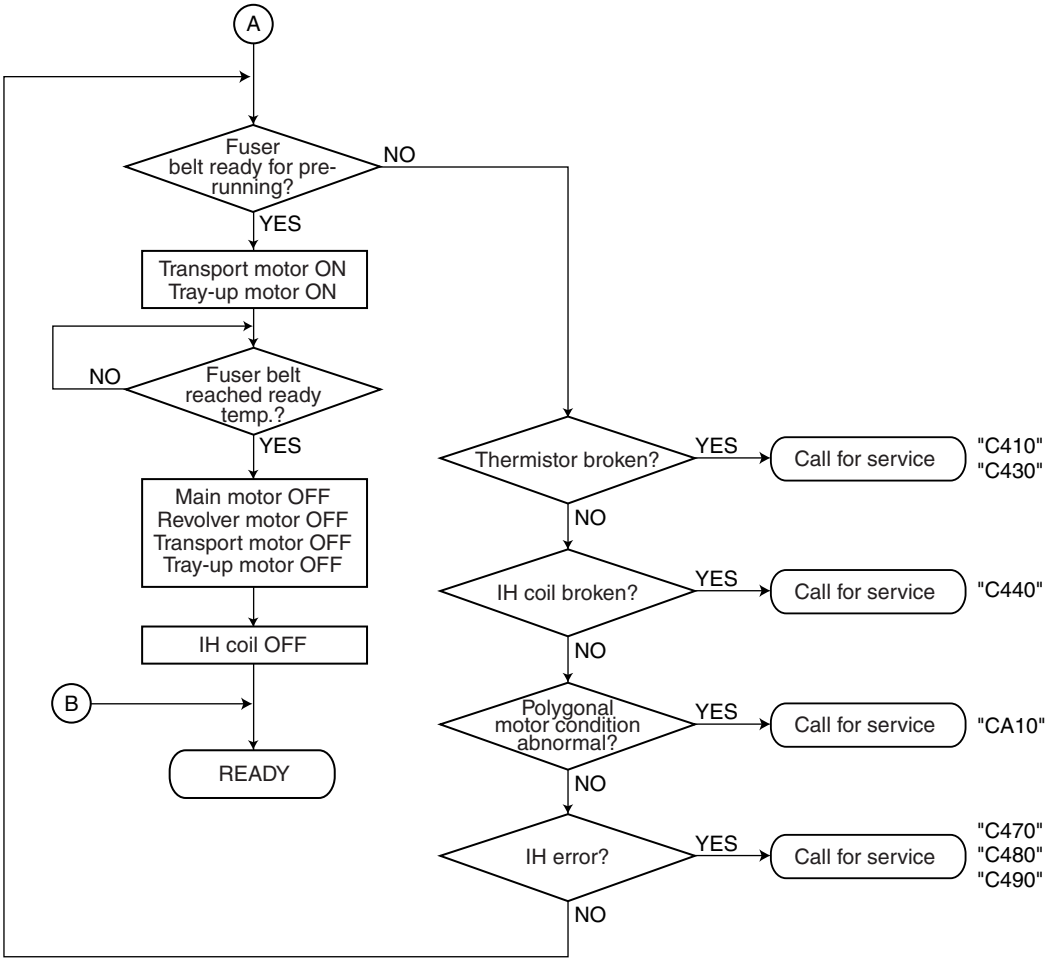
Error code is displayed instead of the set number by pressing the [CLEAR] button and [8] button simultaneously when the “Call for service” is blinking.

Refer to the error code table in the Service Handbook.

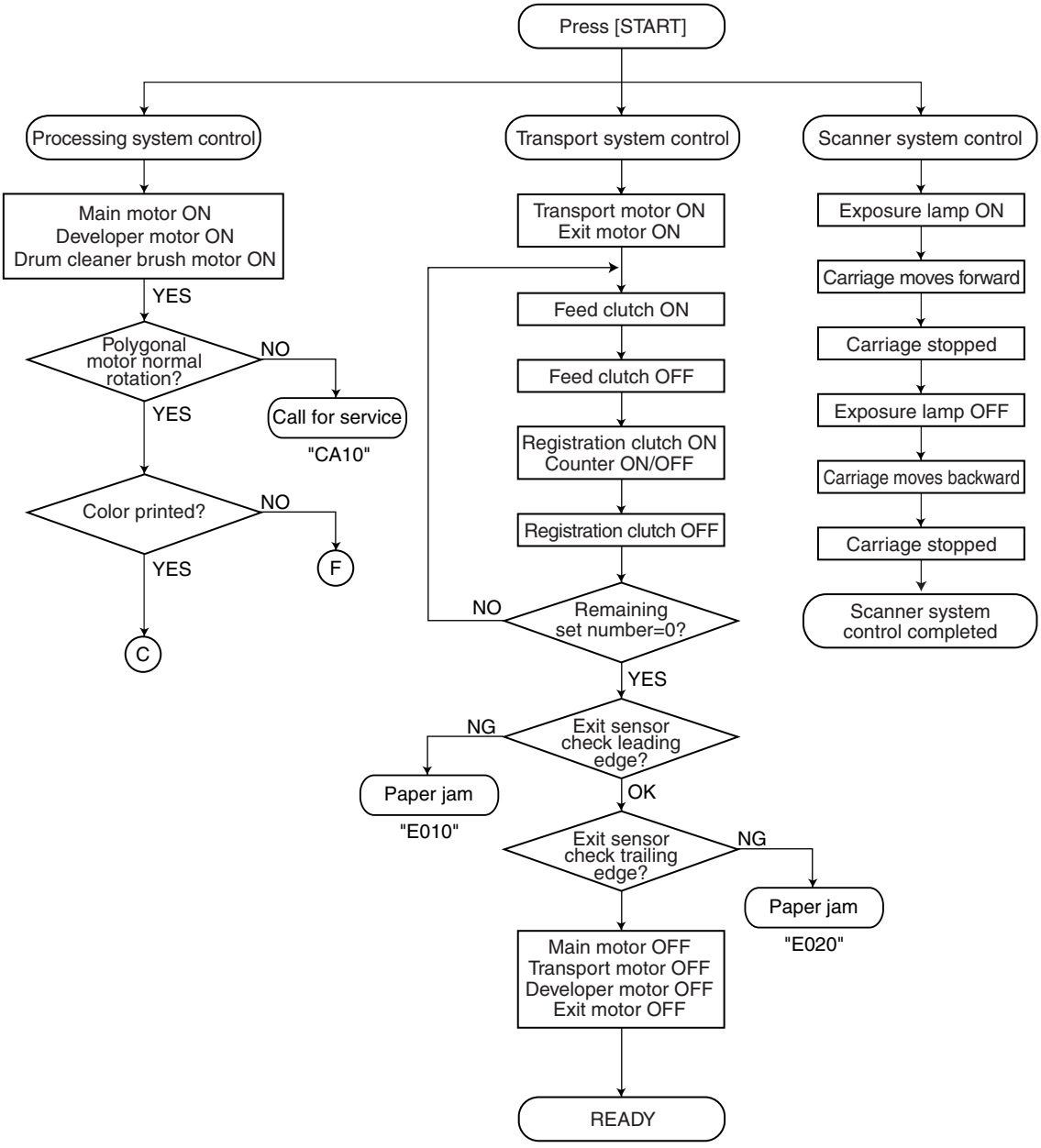
4.4 Flow Chart

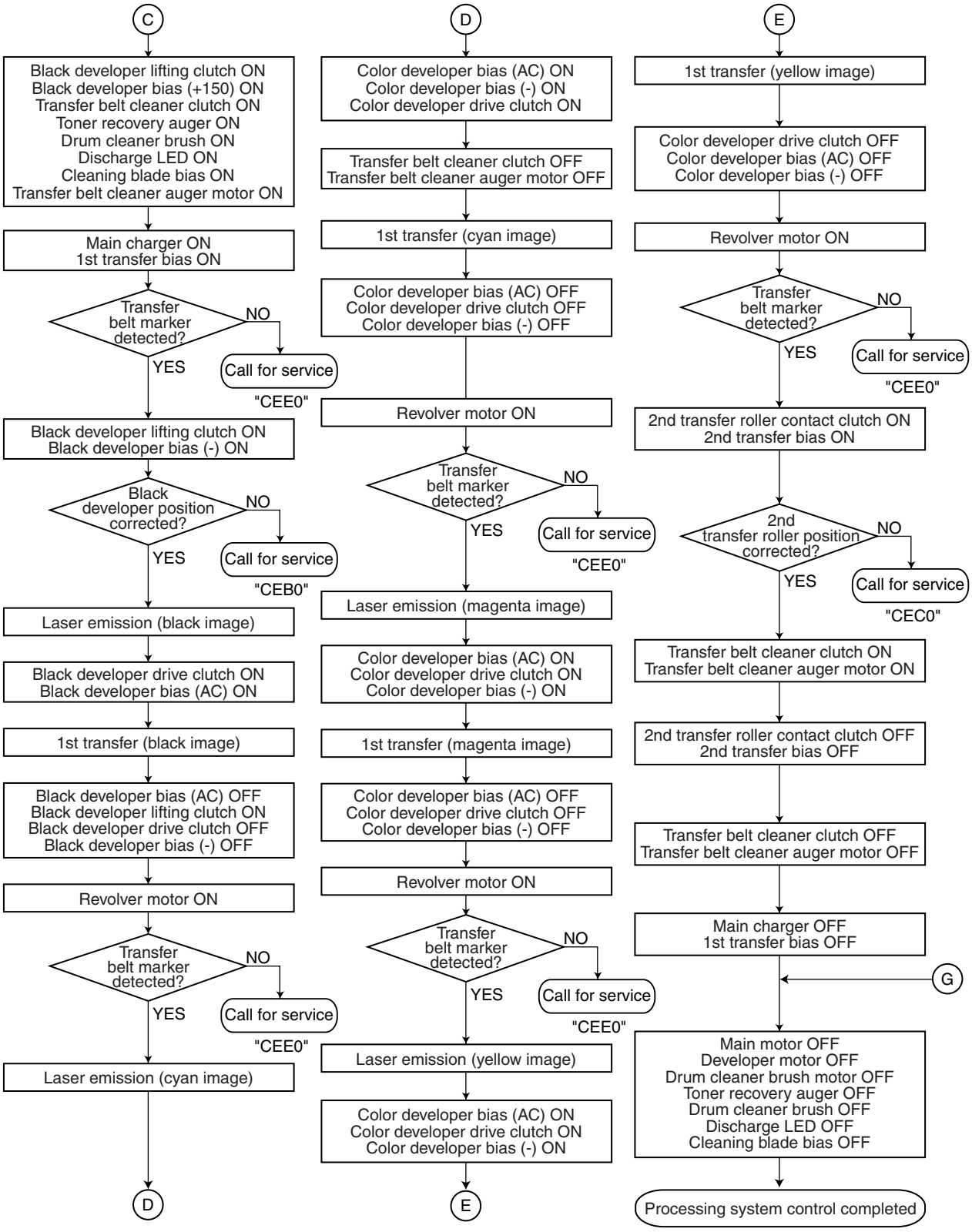
4.4.1 Power ON to ready

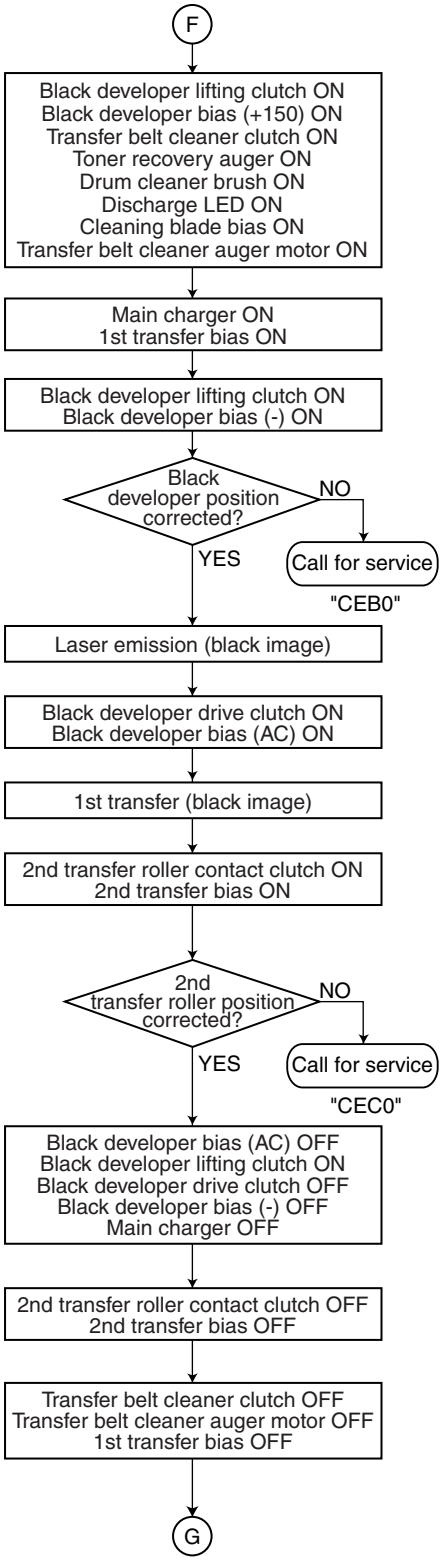



A
Fuser belt ready for pre-running?
NO
YES
Transport motor ON
Tray-up motor ON
NO
Fuser belt reached ready temp.?
YES
Main motor OFF
Revolver motor OFF
Transport motor OFF
Tray-up motor OFF
IH coil OFF
B
READY
Thermistor broken?
YES
Call for service
"C410"
"C430"
NO
IH coil broken?
YES
Call for service
"C440"
NO
Polygonal motor condition abnormal?
YES
Call for service
"CA10"
NO
IH error?
YES
Call for service
"C470"
"C480"
"C490"
NO

4.4.2 Automatic feed copying



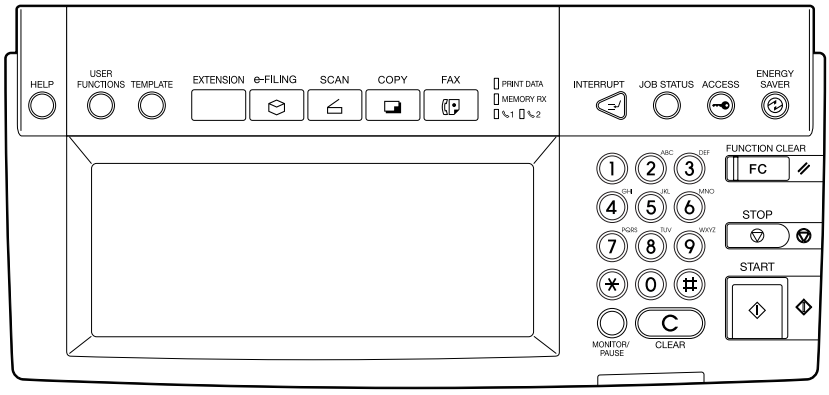

C
Black developer lifting clutch ON
Black developer bias (+150) ON
Transfer belt cleaner clutch ON
Toner recovery auger ON
Drum cleaner brush ON
Discharge LED ON
Cleaning blade bias ON
Transfer belt cleaner auger motor ON
Main charger ON
1st transfer bias ON
Transfer belt marker detected?
NO
YES
Call for service
"CEE0"
Black developer lifting clutch ON
Black developer bias (-) ON
Black developer position corrected?
NO
YES
Call for service
"CEB0"
Laser emission (black image)
Black developer drive clutch ON
Black developer bias (AC) ON
1st transfer (black image)
Black developer bias (AC) OFF
Black developer lifting clutch ON
Black developer drive clutch OFF
Black developer bias (-) OFF
Revolver motor ON
Transfer belt marker detected?
NO
YES
Call for service
"CEE0"
Laser emission (cyan image)
D
D
Color developer bias (AC) ON
Color developer bias (-) ON
Color developer drive clutch ON
Transfer belt cleaner clutch OFF
Transfer belt cleaner auger motor OFF
1st transfer (cyan image)
Color developer bias (AC) OFF
Color developer drive clutch OFF
Color developer bias (-) OFF
Revolver motor ON
Transfer belt marker detected?
NO
YES
Call for service
"CEE0"
Laser emission (magenta image)
Color developer bias (AC) ON
Color developer drive clutch ON
Color developer bias (-) ON
1st transfer (magenta image)
Color developer bias (AC) OFF
Color developer drive clutch OFF
Color developer bias (-) OFF
Revolver motor ON
Transfer belt marker detected?
NO
YES
Call for service
"CEE0"
Laser emission (yellow image)
Color developer bias (AC) ON
Color developer drive clutch ON
Color developer bias (-) ON
E
E
1st transfer (yellow image)
Color developer drive clutch OFF
Color developer bias (AC) OFF
Color developer bias (-) OFF
Revolver motor ON
Transfer belt marker detected?
NO
YES
Call for service
"CEE0"
2nd transfer roller contact clutch ON
2nd transfer bias ON
2nd transfer roller position corrected?
NO
YES
Call for service
"CEC0"
Transfer belt cleaner clutch ON
Transfer belt cleaner auger motor ON
2nd transfer roller contact clutch OFF
2nd transfer bias OFF
Transfer belt cleaner clutch OFF
Transfer belt cleaner auger motor OFF
Main charger OFF
1st transfer bias OFF
G
Main motor OFF
Developer motor OFF
Drum cleaner brush motor OFF
Toner recovery auger OFF
Drum cleaner brush OFF
Discharge LED OFF
Cleaning blade bias OFF
Processing system control completed


F
Black developer lifting clutch ON
Black developer bias (+150) ON
Transfer belt cleaner clutch ON
Toner recovery auger ON
Drum cleaner brush ON
Discharge LED ON
Cleaning blade bias ON
Transfer belt cleaner auger motor ON
Main charger ON
1st transfer bias ON
Black developer lifting clutch ON
Black developer bias (-) ON
Black developer position corrected?
NO
YES
Call for service
"CEB0"
Laser emission (black image)
Black developer drive clutch ON
Black developer bias (AC) ON
1st transfer (black image)
2nd transfer roller contact clutch ON
2nd transfer bias ON
2nd transfer roller position corrected?
NO
YES
Call for service
"CEC0"
Black developer bias (AC) OFF
Black developer lifting clutch ON
Black developer drive clutch OFF
Black developer bias (-) OFF
Main charger OFF
2nd transfer roller contact clutch OFF
2nd transfer bias OFF
Transfer belt cleaner clutch OFF
Transfer belt cleaner auger motor OFF
1st transfer bias OFF
G

5. CONTROL PANEL

5.1 Control Panel and Display Panel

The control panel consists of button switches and touch-panel switches to operate equipment and select various modes, and LEDs and an LCD to display the state of the equipment or the messages.
When the operator's attention is required, graphic symbols appear with messages explaining the condition of the equipment in the LCD panel.
This equipment has a movable control panel which enables to adjust its angle to the operator. It also has improved its operatability and visibility with the enlarged LCD panel.



[Control Panel Outside View]

Fig. 5-101

5.2 Items Shown on the Display Panel

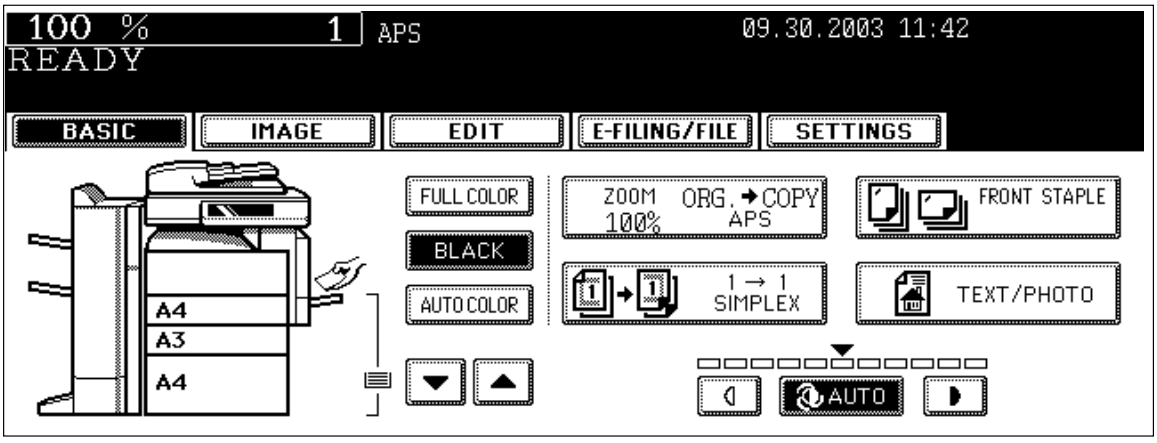


Fig. 5-201

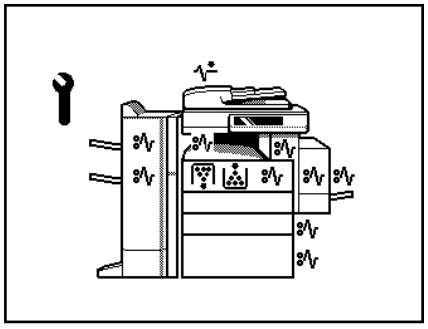


Fig. 5-202

5.2.1 Display

No.	Message	State of equipment	Note
1	-	Power is OFF (at Sleep Mode)	Press [START] button or [FUNCTION] button to clear
2	Saving energy - press START button	At Energy Saving Mode	Press [START] button to clear
3	Wait Warming Up	Scanner warming up - Displayed until the equipment becomes ready to start scanning	Auto Start can be set
4	Wait Warming Up Auto Start	Scanner warming up - Displayed when Auto Start is set	Press [STOP] button to clear the Auto Start.
5	WAIT	Displayed when performing the controlling function such as cleaning of 2nd transfer roller or main charger to keep the equipment at the best condition	
6	Wait adding toner	Supplying toner - Equipment becomes the toner supply state	Recovers when the toner supply has finished
7	Performing Auto Calibration	Displayed at image quality control	Recovers when the image quality control has finished
8	READY	Ready for copying - Waiting for the operation	
9	READY Press START button to copy	Copying job interrupted	Press [START] button to resume copying or press [MEMORY CLEAR] button to delete the job
10	READY (WARMING UP)	Scanner warming up - Ready to scan the original	
11	READY (PRINTING)	Printing out the data - Scanning is enabled	
12	READY (ADDING TONER)	Supplying toner - Scanning is enabled	
13	READY (INNER TRAY FULL)	Receiving tray in the equipment is full - Scanning is enabled	- When the bridge unit is installed - Resumes printing by removing papers from the tray
14	READY (CHECK STAPLER)	No staples in finisher - Scanning is enabled	Cleared by supplying the staples
15	READY (CHECK STAPLER)	Stapling jam occurred in finisher	
16	READY (CHECK SADDLE STITCH STAPLER)	No staples in saddle stitcher - Scanning is enabled	Cleared by supplying staples
17	READY (ADD PAPER) Press JOB STATUS button	No paper in drawer - Scanning is enabled	Cleared by supplying papers
18	READY (FINISHER FULL)	Finisher is full of paper - Scanning is enabled	Resumes printing by removing paper from the finisher
19	READY (HOLE PUNCH DUST BIN IS FULL)	Punching dust box is full - Scanning is enabled	Resumes printing by removing punching dust from the dust box

No.	Message	State of equipment	Note
20	READY (SADDLE STITCH TRAY FULL)	Saddle stitcher tray is full of paper - Scanning is enabled	
21	READY (CHANGE DRAWER TO CORRECT PAPER SIZE)	Incorrect paper size setting	
22	Ready for bypass feeding	Paper is set on the bypass tray	
23	COPYING	At the copying state	
24	Auto Start	Auto Start is set during printing	Cleared by pressing [RESET] button or [STOP] button
25	Close Large Capacity Feeder	LCF drawer is not installed when feeding from LCF is set	Cleared by installing LCF drawer
26	Close Large Capacity Feeder Door	LCF cover is open when feeding from LCF is set	Cleared by closing the cover
27	Place Doc. Feeder in the down position	RADF is open when original is placed on RADF	Cleared by closing RADF
28	Insert key copy counter	Key copy counter not inserted	Cleared by inserting key copy counter
29	Place originals in the document feeder	Displayed when the conditions are set and START button is pressed with no original placed	Cleared by setting the original
30	Change direction of original	Displayed when the direction of original placed is different from the setting	
31	Place last %d originals in doc. feeder entrance tray	Paper jam occurred during copying (RADF scanning)	
32	Cannot copy this original	Displayed when the original which is not allowed to be copied is placed	Not printed out
33	Add paper	Displayed when the paper in selected drawer is running out	
34	Cannot duplex this size	Displayed when the paper size which is not specified for duplex copying is set	
35	Cannot use this media type	Displayed when the paper size which is not specified for the functions such as stapling or hole punching is set	
36	Copy size: A4/LT only	Displayed when the paper size which is not specified for “Book-type duplex copying” or “Dual-page” is set	
37	Copy size: A4/LT and A4-R/LT-R	Displayed when the paper size which is not specified for “Rotate Sort”	
38	CHANGE DRAWER TO CORRECT PAPER SIZE	Displayed when the selected paper size is not in the drawer	
39	Change drawer to correct media type	Displayed when the selected media type is not in the drawer	

No.	Message	State of equipment	Note
40	Select a paper size for bypass feeding	Displayed when paper size needs to be specified for bypass feeding such as duplex copying	
41	Place the blank sheets in bypass tray and select the paper size	Displayed when no paper is in the selected feeder at Cover Copying Mode	
42	Place the blank sheets in the same direction as the originals	Displayed when the direction of cover page is different from that of other pages at Cover Copying Mode	
43	Place the same size blank sheets as the originals	Displayed when the paper size of cover page is different from that of other pages at Cover Copying Mode	
44	Place insertion sheets in the bypass tray and select the paper size	Displayed when no insertion sheet is in the selected drawer at Sheet Insertion Mode	
45	Select the same size insert1 sheets as the originals	Displayed when the size of insertion sheet (sheet 1) is different from that of other pages at Sheet Insertion Mode	
46	Select the same size insert2 sheets as the originals	Displayed when the size of insertion sheet (sheet 2) is different from that of other pages at Sheet Insertion Mode	
47	Set insert1 sheets in the same direction as the originals	Displayed when the direction of insertion sheet (sheet 1) is different from that of other pages at Sheet Insertion Mode	
48	Set insert2 sheets in the same direction as the originals	Displayed when the direction of insertion sheet (sheet 2) is different from that of other pages at Sheet Insertion Mode	
49	Set transparency film in A4/LT direction	Displayed when the selected paper size is other than A4/LT at OHP mode	
50	CHECK PAPER IN LARGE CAPACITY FEEDER	Papers in LCF are set incorrectly	
51	CANNOT PUNCH THIS SIZE PAPER	Displayed when the selected paper size is not specified for hole punching	
52	Remove paper from the finisher	Displayed when the paper sizes are mixed at Staple Sorting Mode	
53	Cannot staple this size	Displayed when the paper size is not specified for stapling at Staple Sorting Mode	
54	Remove paper from the saddle stitch unit	Finisher is full of papers	
55	Examine stapler	Trouble in the stapler unit in finisher	
56	Check staple cartridge	No stapler in finisher section	
57	Check staple cartridge in the saddle stitch unit	No stapler in saddle stitch unit	

No.	Message	State of equipment	Note
58	Job interrupted job 1 saved	Interrupt copying is accepted	
59	Ready to resume job 1	Interrupt copying is cancelled (finished)	
60	Cannot use AMS mode	Displayed when reproduction ratio is set to be over 200% at AMS Mode on RADF	Set the reproduction ratio 200% or below manually
61	More than 200% is not available	Displayed when reproduction ratio is set manually to be over 200% on RADF	Set the reproduction ratio 200% or below
62	Updated the template setting	Displayed when the template stored is recalled by pressing [TEMPLATE] button	
63	Enter Department Code	Displayed when a button is pressed while the department management setting is available	
64	Cannot copy BLACK mode Check DEPARTMENT COUNTER	Displayed when the number of printouts exceeds the limit number of department counter	
65	Cannot copy FULL COLOR mode Check DEPARTMENT COUNTER	Displayed when the number of printouts exceeds the limit number of department counter	
66	Cannot copy TWIN COLOR mode Check DEPARTMENT COUNTER	Displayed when the number of printouts exceeds the limit number of department counter	
67	Cannot copy Check DEPARTMENT COUNTER	Displayed when the number of printouts exceeds the limit number of department counter	
68	Not enough memory to store original(s) Will you print out stored originals?	Displayed when confirming the user to print out the data as much as stored at memory - full state	
69	Not enough memory to store original(s) Will you send stored originals in?	Displayed when confirming the user to send the FAX data as much as stored at memory - full state	Displayed only in FAX Function
70	Not enough memory to store original(s) Will you save stored originals in?	Displayed when confirming the user to save the scanning data as much as stored at memory-full state	Displayed only in FAX Function
71	The number of originals exceeds the limits Will you copy stored originals?	Displayed when confirming the user to print out the data as much as stored at memory-full state	
72	The number of originals exceeds the limits. Will you send stored originals?	Displayed when confirming the user to send the FAX data as much as stored at memory-full state	Displayed only in FAX Function

No.	Message	State of equipment	Note
73	The number of originals exceeds the limits. Will you save stored originals?	Displayed when confirming the user to save the scanning data as much as stored at memory-full state	Displayed only in Scanning Function
74	Install new Black toner cartridge	No black toner in the cartridge	Displayed when black toner is running out even if other toner still remain. Copying not enabled
75	Install new Yellow toner cartridge	No yellow toner in the cartridge	Black copying is available Other button functions are available
76	Install new Magenta toner cartridge	No magenta toner in the cartridge	Black copying is available Other button functions are available
77	Install new Cyan toner cartridge	No cyan toner in the cartridge	Black copying is available Other button functions are available
78	Install new Y and M toner cartridge	No yellow and magenta toner in the cartridges	Black copying is available Other button functions are available
79	Install new Y and C toner cartridge	No yellow and cyan toner in the cartridges	Black copying is available Other button functions are available
80	Install new M and C toner cartridge	No magenta and cyan toner in the cartridges	Black copying is available Other button functions are available
81	Install new color toner cartridge	Three colors of toner are running out in the cartridges	Black copying is available Other button functions are available
82	Time for periodic maintenance	PM cycle - Displayed at the time for maintenance - Copying is available	Maintenance and inspection are performed by qualified service technician.
83	READY (CHANGE DRAWER TO CORRECT MEDIA TYPE)	Displays when the printing is stopped because of media type mismatch	
84	PRESS [BASIC] and select normal paper size	Displays the warning that the copy is not enabled when any drawer but bypass feed is selected at Cover Sheet Mode or Sheet Insertion Mode.	
85	Misfeed in copier Press [HELP]	Paper jam in the equipment - Displayed when paper jam occurred in the equipment	Remove the paper in the equipment according to the messages displayed on the panel.
86	Call for service	Displayed when motor, sensor, switch, etc. do not work properly	Turn OFF the power and solve the problem, then turn ON the power.
87	Please try again after a while	Displayed when the Department Code can no be keyed in immediately after power-ON.	Leave it for a while and key in the code again
88	Set standard size	Displayed when the paper size which is not acceptable is set (depends on the setting)	Reset the paper size

5.3 Relation between the Equipment State and Operator's Operation

	During READY status	During warming-up	Auto job start reserved	Scanning original/ Scanning original and printing out the copy	Printing out the copy	During paper jam	When interrupting	When displaying HELP screen	During energy saving mode
Press [ENERGY SAVER] button	Switches to energy saving mode	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Switches to energy saving mode	Energy saving mode is cleared and displays BASIC screen
Press [ACCESS] button	Displays department code entry screen (when department management is available)	Displays department code entry screen (when department management is available)	Display not changed	Display not changed	Displays department code entry screen (when department management is available)	Display not changed	Displays department code entry screen (when department management is available)	Displays department code entry screen (when department management is available)	Display not changed
Press [JOB STATUS] button	Displays print job list screen	Display not changed	Display not changed	Displays print job list screen	Displays print job list screen	Display not changed	Displays print job list screen	Displays print job list screen	Display not changed
Press [INTERRUPT] button	Switches to interrupt mode	Display not changed	Display not changed	Display not changed (LED blinking)	Display not changed (LED blinking)	Display not changed	Returns to the status before interrupting	Switches to interrupting mode	Display not changed
Press [FUNCTION CLEAR] button after setting the copy mode	Copy mode is cleared after the copy mode is set	Copy mode is cleared after the copy mode is set	Auto job start cancelled	Display not changed	Copy mode is cleared after the copy mode is set	Display not changed	Copy mode is cleared after the copy mode is set	Displays BASIC screen after the copy mode is set and then cancelled	Display not changed
Press [STOP] button	Display not changed	Display not changed	Auto job start cancelled	Scanning or printing out stops, and "READY Press START to copy" and "MEMORY CLEAR" are displayed	Printing out stops, and "READY Press START to copy" and "MEMORY CLEAR" are displayed	Display not changed	Display not changed	Display not changed	Display not changed
Press [CLEAR] button after setting the copy mode	Number of printouts changes to 1 while the setting remains unchanged after the copy mode is set	Number of printouts changes to 1 while the setting remains unchanged after the copy mode is set	Display not changed	Display not changed	Number of printouts changes to 1 while the setting remains unchanged after the copy mode is set	Display not changed	Number of printouts changes to 1 while the setting remains unchanged after the copy mode is set	Number of printouts changes to 1 while the setting remains unchanged after the copy mode is set	Display not changed
Press [CLEAR] button after keying in numbers (digital keys)	Number keyed in changes to 1 after being entered	Number keyed in changes to 1 after being entered	Display not changed	Display not changed	Number keyed in changes to 1 after being entered	Display not changed	Number keyed in changes to 1 after being entered	Number keyed in changes to 1 after being entered	Display not changed
Press [MONITOR/ PAUSE]	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed
Press [FAX] button	Displays FAX screen	Display not changed	Display not changed	Display not changed	Displays FAX screen	Display not changed	Display not changed	Displays FAX screen	Displays FAX screen
Press [COPY] button	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Displays COPY screen
Press [SCAN] button	Displays SCAN screen	Display not changed	Display not changed	Display not changed	Displays SCAN screen	Display not changed	Display not changed	Displays SCAN screen	Displays SCAN screen
Press [e-FILING]	Displays e-FILING screen	Display not changed	Display not changed	Display not changed	Displays e-FILING screen	Display not changed	Display not changed	Displays e-FILING screen	Displays e-FILING screen
Press [EXTENSION] button	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed
Press [TEMPLATE] button	Displays TEMPLATE screen	Display not changed	Display not changed	Display not changed	Displays TEMPLATE screen	Display not changed	Display not changed	Displays TEMPLATE screen	Display not changed
Press [USER FUNCTIONS] button	Displays USER FUNCTIONS screen	Display not changed	Display not changed	Display not changed	Displays USER FUNCTIONS screen	Display not changed	Display not changed	Displays USER FUNCTIONS screen	Display not changed
Press [HELP] button	Displays HELP screen	Displays HELP screen	Display not changed	Display not changed	Displays HELP screen	Display not changed	Displays HELP screen	Switches to the screen previously displayed	Display not changed
Press [START] button with the original set on RADF	Displays "COPYING"	"Wait Warming Up Auto Start" is displayed	Display not changed	Display not changed	Displays "COPYING" and RADF starts feeding	Display not changed	Displays "COPYING" and RADF starts feeding	Displays "COPYING" and RADF starts feeding	Energy saving mode is cleared and displays BASIC screen

5.4 Description of Operation

5.4.1 Dot matrix LCD circuit

(1) Structure

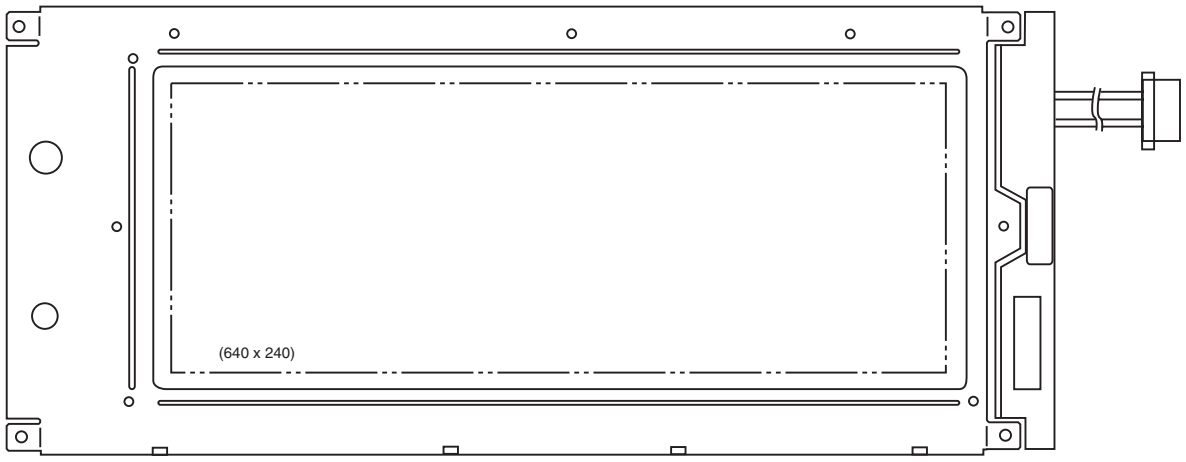


Fig. 5-401

The DSP-LCD-350 is an STN blue mode transmissive type LCD with 640x240-dot display capacity. It consists of a driver LSI, frame, printed circuit board, and lateral type CCFL backlight.

* STN: Super Twisted Nematic

* CCFL: Cold Cathod Fluorescent Lamp

(2) Block diagram

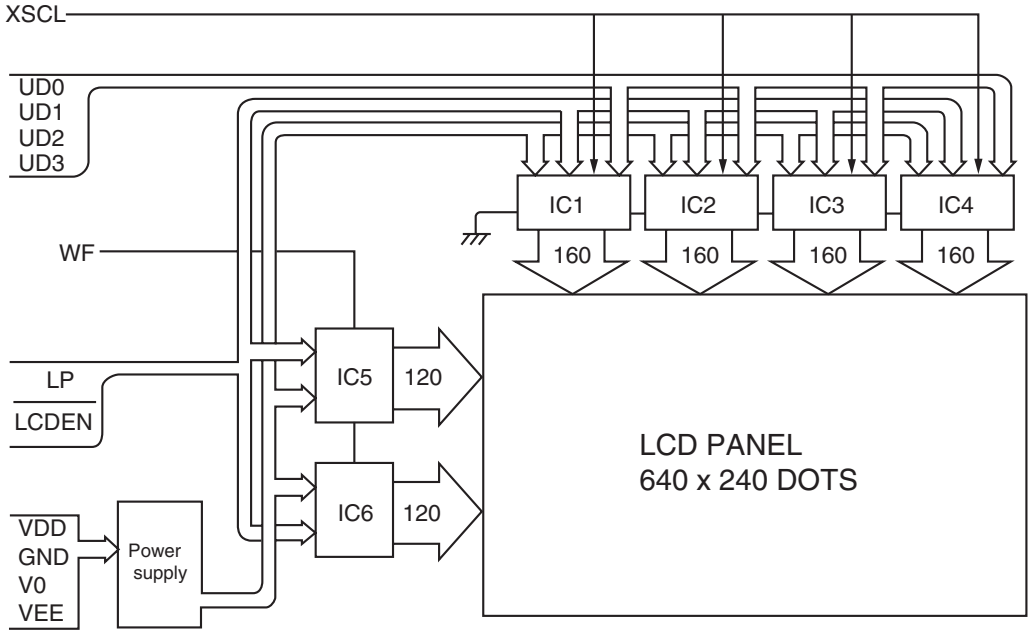


Fig. 5-402

(3) System diagram

Signals flowing between the control panel and the system board are indicated in the chart below. When the panel processing CPU detects that the control panel is operated, the operational contents are transmitted to the System board through the serial data. The state of the equipment and the messages from the System board are received by the LCD controller and then displayed on the LCD. The LED and buzzers are switched to ON/OFF with the signals from the System control PC board.

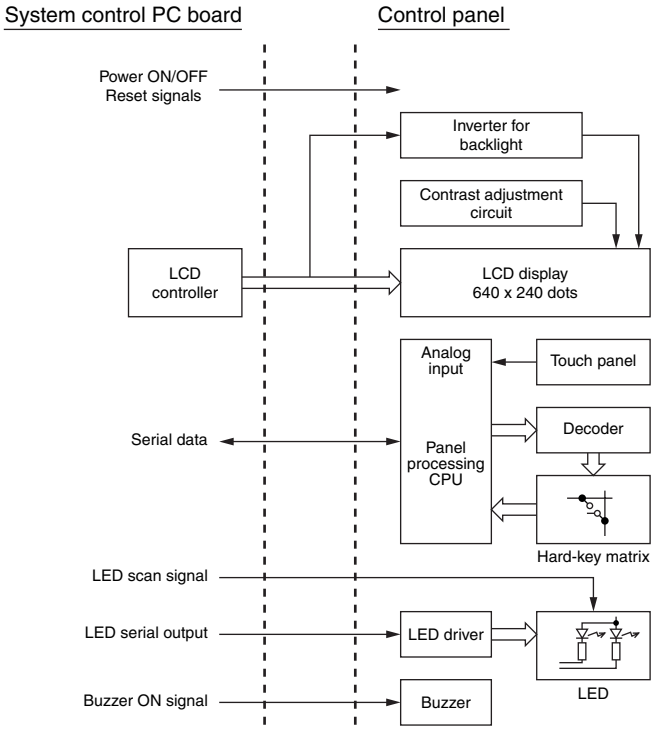


Fig. 5-403

(4) Data Transmission

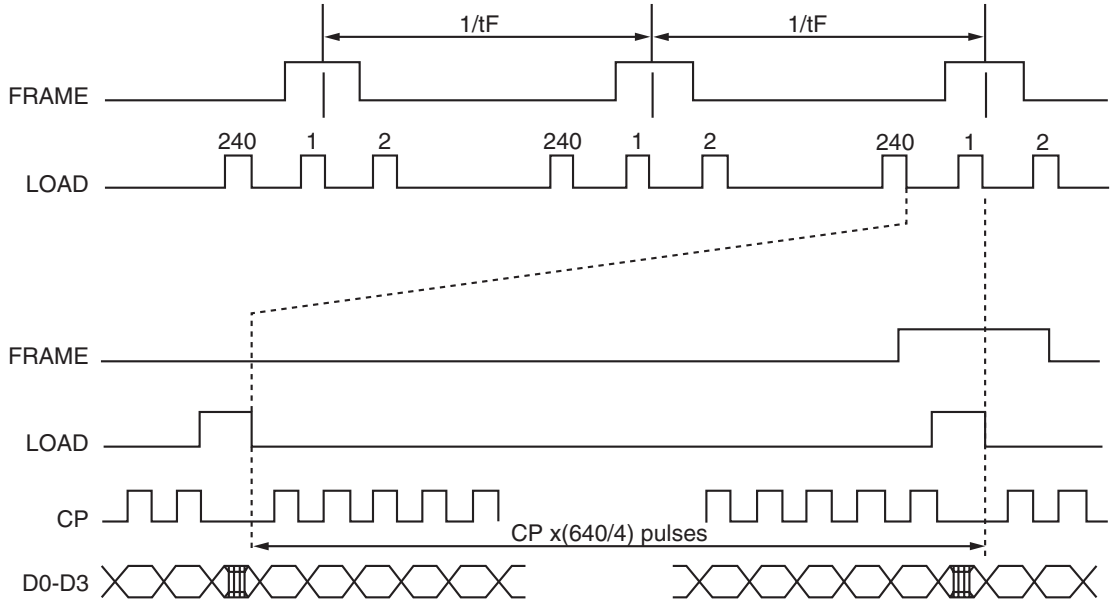


Fig. 5-404

5.4.2 LED display circuit

(1) Method of LED display

ex) Displaying “COPY” .

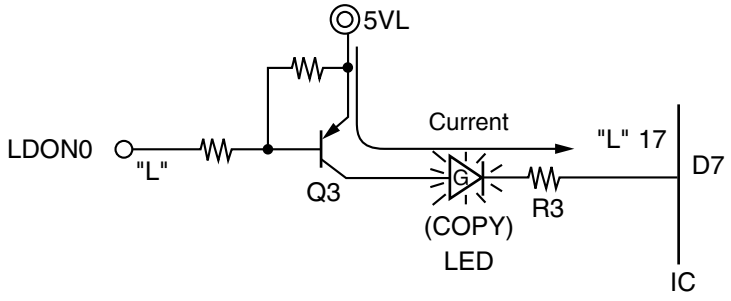


Fig. 5-405

Transistor is turned ON when the LDON 0 signal becomes “L” level.

Also, when IC pin changes to “L”, the current flows from 5VL via the transistor to the LED (“COPY”) to turn ON the LED (“COPY”).

Conditions to turn ON the LED

(a) The transistor (Q3) connected to the LED anode is ON.

(b) The output from the cathode side of the LED is “L” level.

The LED turns ON when the conditions (a) and (b) are met.

5.5 Disassembly and Replacement

Note: When taking off the control panel, check the position of the stopper; if the stopper is at the position “b”, remove the stopper or move it to the position “a”.

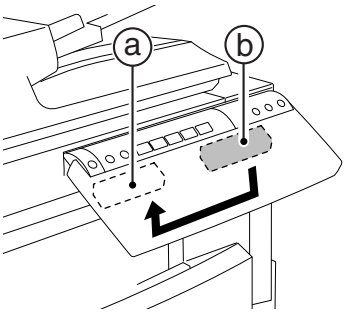


Fig. 5-501

5

[A] Stopper

(1) Slide the stopper and pull it out.

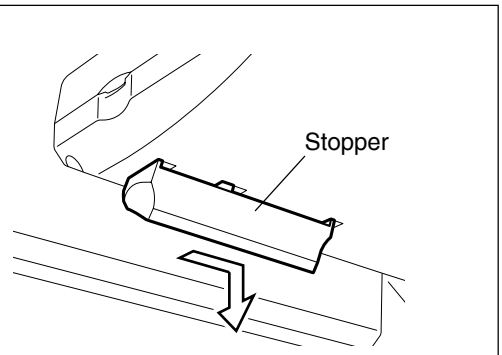


Fig. 5-502

[B] Control panel unit

(1) Take off the right upper cover and the front upper cover (► Chapter 2.5.1 [J] [I]).
(2) Disconnect 1 connector.
(3) Remove 2 screws and take off 2 harness clamps.

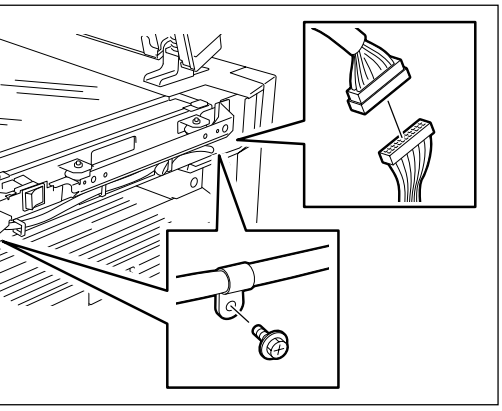


Fig. 5-503

(4) Lower the control panel and remove 6 screws.
(5) Take off the control panel unit while sliding it.

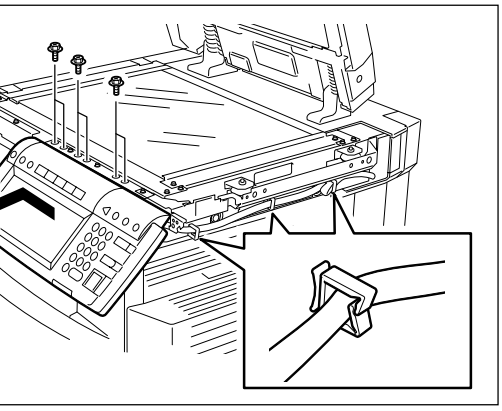


Fig. 5-504

(6) Remove 3 screws and take off the cover.

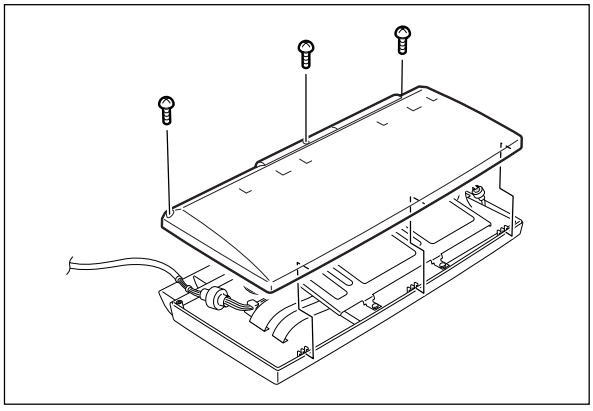


Fig. 5-505

(7) Remove 5 screws and take off the hinge bracket.

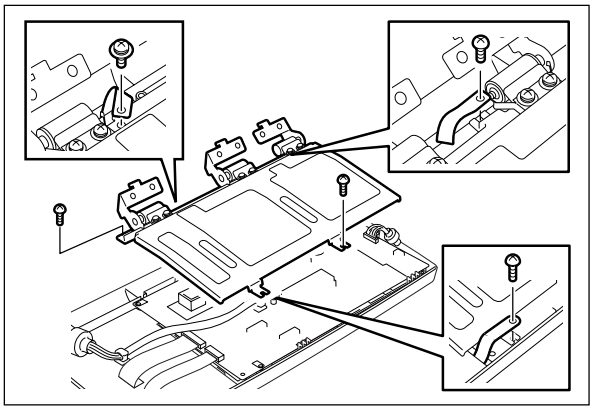


Fig. 5-506

(8) Disconnect 5 connectors and 1 harness clamp, take off the DSP board.

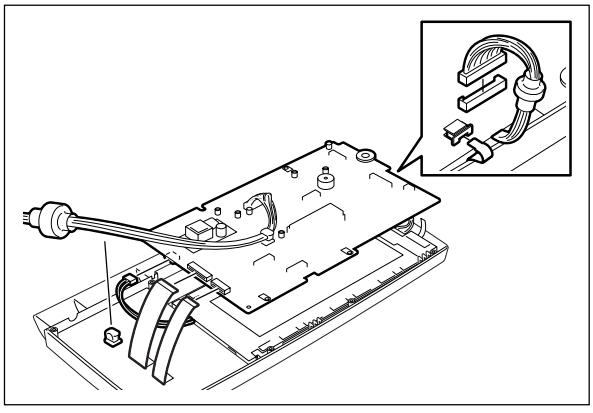


Fig. 5-507

(9) Remove 4 screws and take off the LCD.

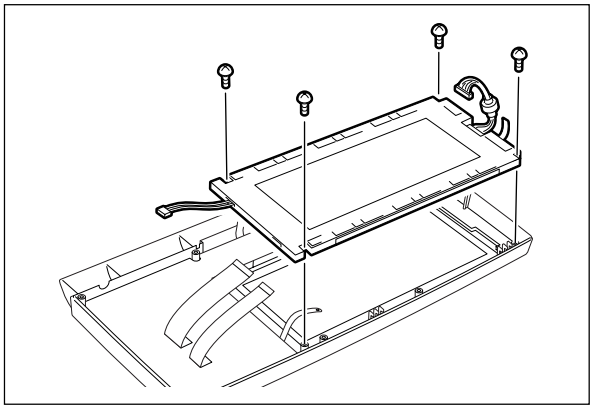


Fig. 5-508

(10) Remove 16 screws and take off the KEY board.

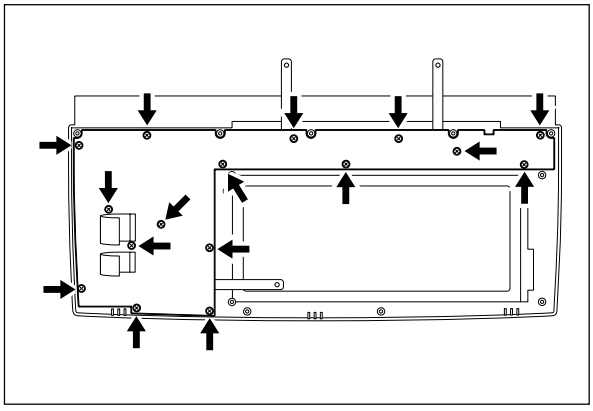


Fig. 5-509

6. SCANNER

6.1 Function

In the scanning section of this equipment, the surface of an original is irradiated with a direct light and the reflected light is led through mirrors, a lens and a slit to CCD where optical-to-electrical conversion is performed, converting the optical image data into an electrical (analog) signal. This analog signal is changed to a digital signal, which then undertakes various corrective processes necessary for image formation. After that, arithmetic operation is performed on the digital signal, which is then transmitted to the data writing section.

In this equipment, a reduction-type CCD for color processing is used. What this CCD differs from black-and-white CCDs is that its devices are arranged in 4 lines and covered with color filters (Red, Green, and Blue). These lines are composed with 3-line color devices and black-and-white device with no filter.

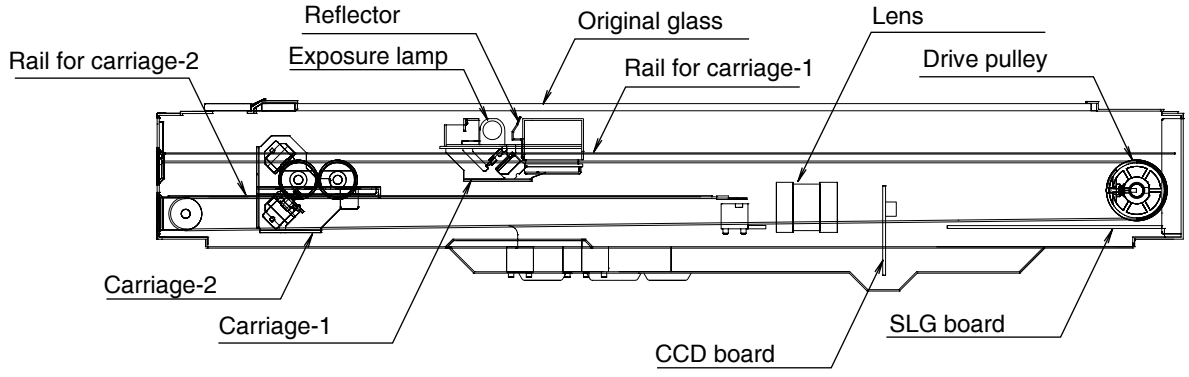


Fig. 6-101

6.2 Construction

The following shows the construction and purpose of the scanning system:

(1) Original glass

This is a glass on which an original is placed. The light from the exposure lamp is irradiated to the original through this glass.

(2) Carriage-1

Carriage-1 consists of the exposure lamp, lamp inverters, reflector, mirror-1, etc. It is driven by the scan motor and scans an original on the glass.

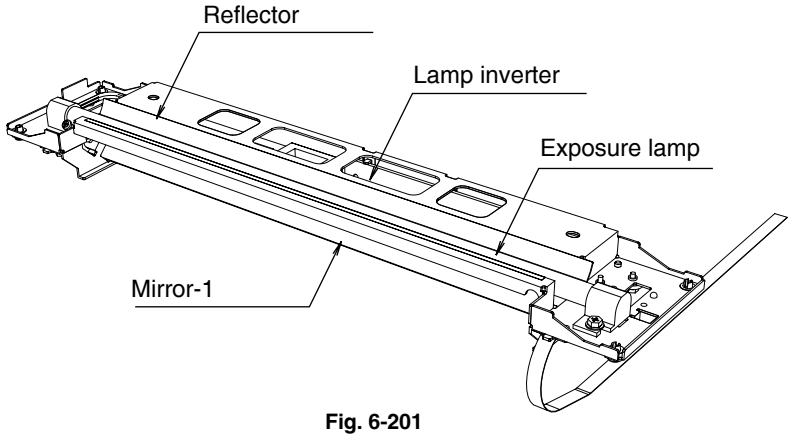


Fig. 6-201

a. Exposure lamp

This lamp is the light source to irradiate the original on the glass. (One 16 W xenon lamp)

b. Lamp inverter

Controls lighting of the xenon lamp.

c. Reflector

This is a plate to efficiently direct the light from the exposure lamp to the surface of the original on the glass.

d. Mirror-1

This mirror directs the light reflected from the original to the mirror-2 described later.

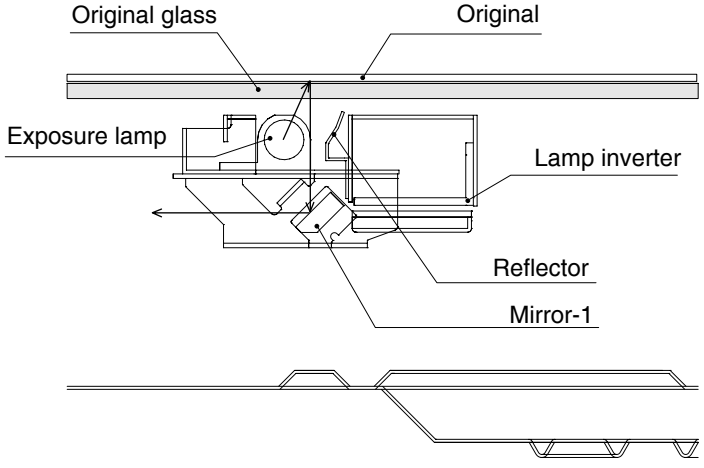


Fig. 6-202

(3) Carriage-2

Carriage-2 mainly consists of the mirror-2, mirror-3, etc. and directs the reflected light from the mirror-1 through the mirrors-2 and -3 to the lens.

This carriage is driven by the same scan motor as that for the carriage-1 at half the scanning speed of the carriage-1 (The scanning distance is also half that of the carriage-1).

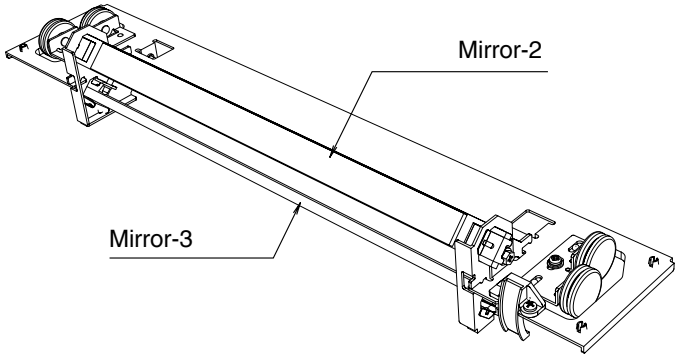


Fig. 6-203

(4) Lens unit

The light reflected from the mirror-3 is led to the CCD placed at the focal point of the lens which is fixed in a position.

(5) CCD driving PC board

Processes such as signal amplification, signal integration and A/D conversion are applied on the electrical signal which was converted by CCD.

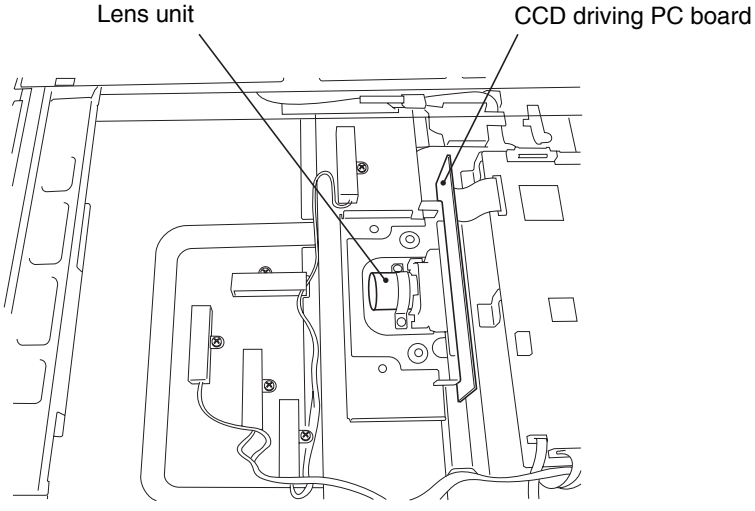


Fig. 6-204

(6) Automatic original detection sensor

The size of an original placed on the glass is instantly detected using the automatic original detection sensors (APS sensor) fixed on the base frame without moving the carriage-1.

6.3 Description of Operation

6.3.1 Scan motor

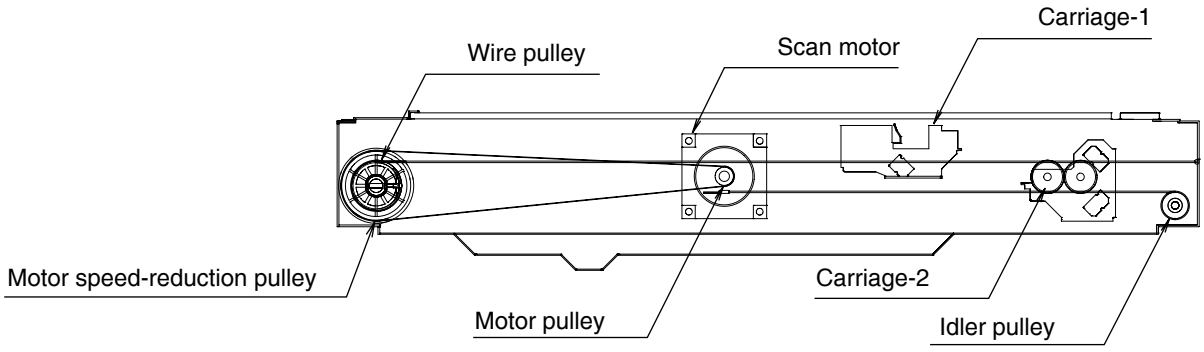


Fig. 6-301

(a) Scanning of an original placed on the original glass

This motor drives the carriages-1 and -2 through the timing belt and carriage wire. First, the scan motor drives the carriages-1 and -2 to their respective home positions. The home positions are detected when the carriage-1 passes the home position sensor. When the [START] button is pressed, the both carriages start to move and scan the original on the glass.

(b) Scanning of an original placed on the RADF

The carriage-1 stays at the shading position during shading correction, and at the scanning position during scanning operation.

(c) Scanning velocity

The scanning velocity at color modes is reduced to a half of it at the Black Mode.

6.3.2 Scanning drive circuit

The scan motor is a 2-phase stepping motor and driven by the driver IC-STK-672-071.

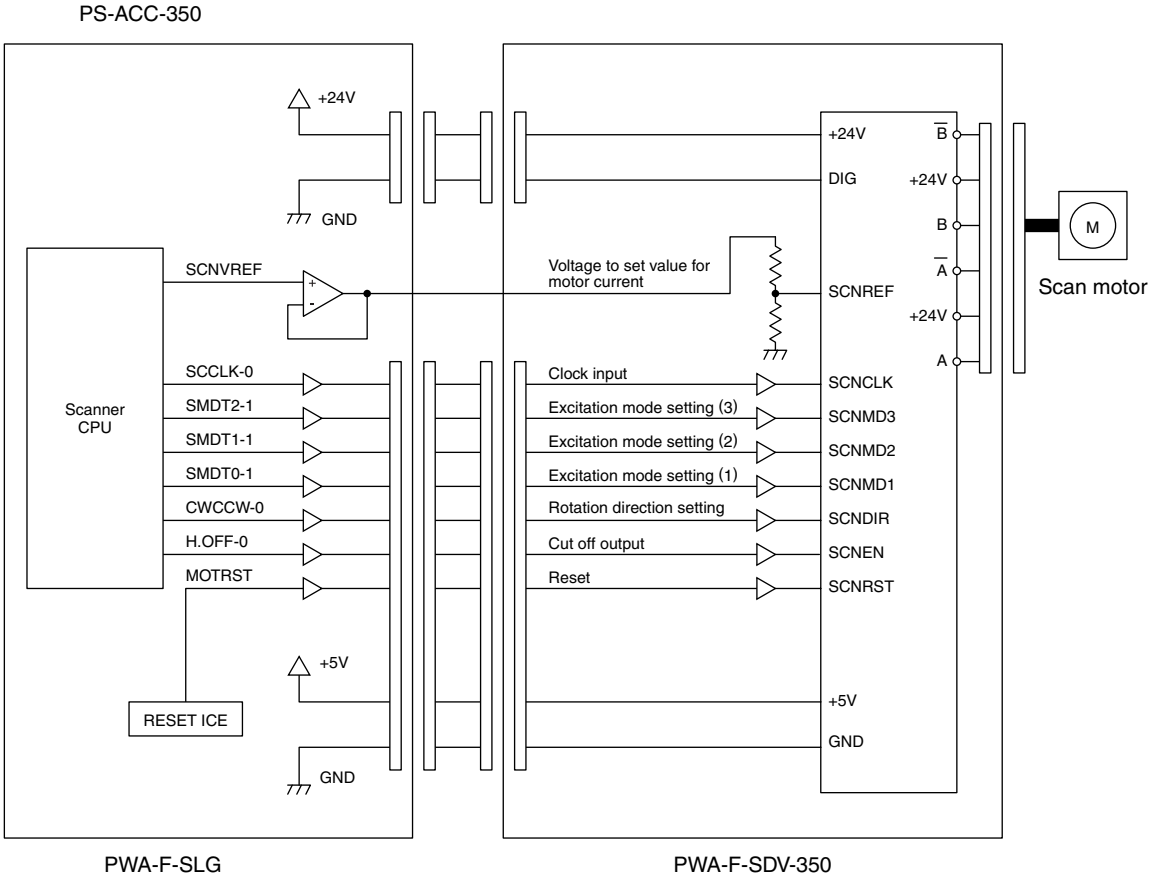


Fig. 6-302

Input/output signals

Clock input	SCNCLK	Input	Motor is rotated by setting number of pulse. * Internal circuit of the motor driver works when the first pulse becomes ON and the last pulse becomes OFF.
Set the direction of motor rotation	SCNDIR	Input	The direction of the motor rotation is determined by setting level of signal. “L” ... Clockwise direction (as seen from the output shaft) “H” .. Counterclockwise direction (as seen from the output shaft)
Cut off the drive output	SCNEN	Input	Excitation drive is forcibly turned ON/OFF. “H” .. Normal operation (Excited) “L” ... Excitation drive is forcibly shut off (Not excited)
Voltage to set value for the motor current	SCNREF	Input	Motor wire current value is set in the range of 0 to 2.0 (A)/phase by applying the analog voltage 0 to 5 (V).
Set the exicitation for the motor current	SCNMD1 to 3	Input	Set the excitation mode.
Reset	RESET	Input	Reset for the whole system Internal circuit of the driver is initialized by setting the motor to “L” level. The motor drive circuit is automatically reset when the power is turned ON.

6.3.3 Initialization at power-ON

The carriage moves to its home position and performs the peak detection.

Then it moves to the carriage waiting position and waits.

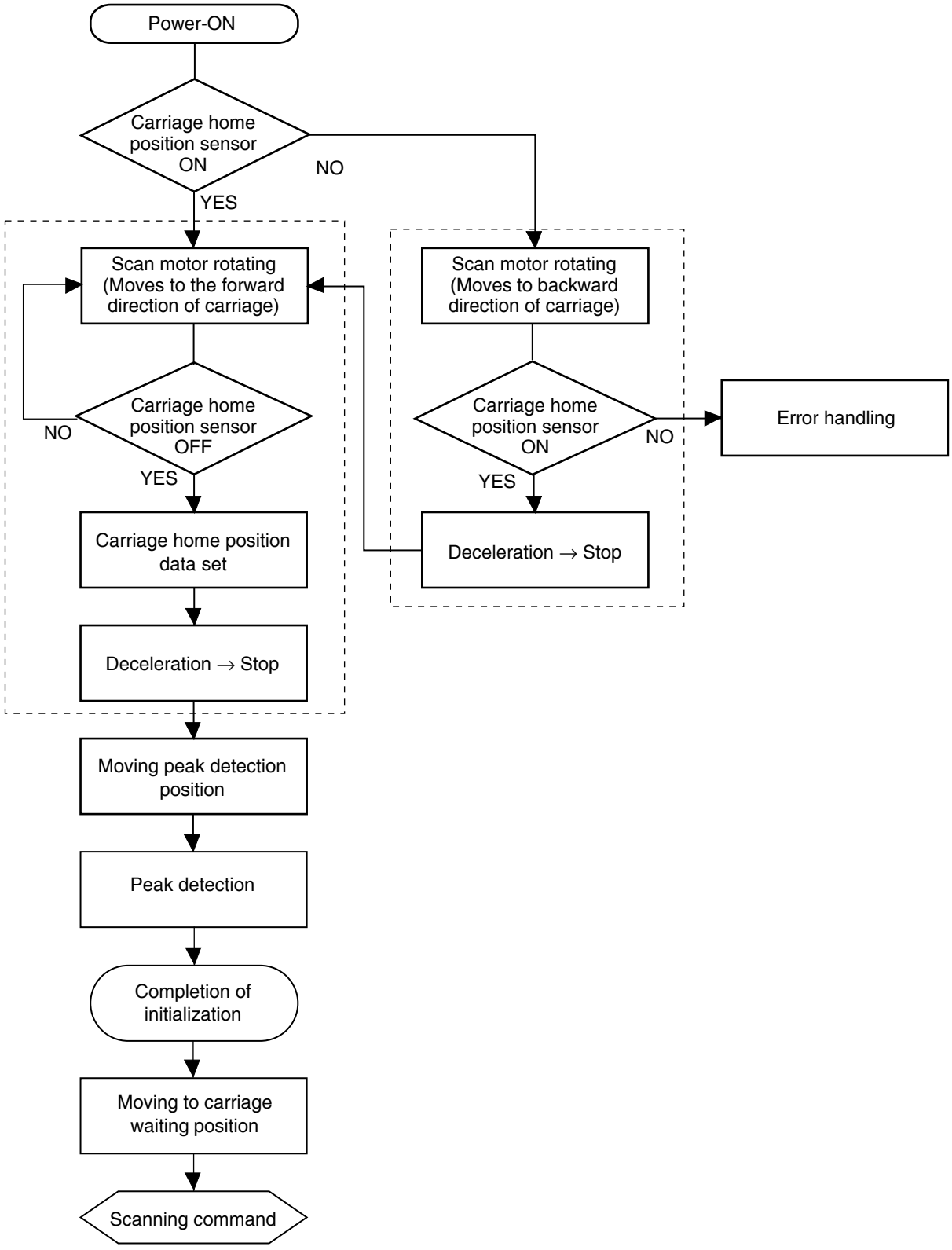


Fig. 6-303

6.4 Control of Exposure Lamp

6.4.1 General description

Control circuit for the exposure lamp consists of the following two blocks:

(1) Lighting device for the xenon lamp (Inverter)

Turns ON/OFF the exposure lamp.

(2) CCD circuit

This circuit converts the reflected light amount from the original surface and the shading correction plate to electrical signals. The exposure amount is controlled in two ways:

(a) White reference formation - reads the reflected light amount from the white shading correction plate

(b) Black reference formation - reads the light amount at the regulation position with the exposure lamp lights OFF

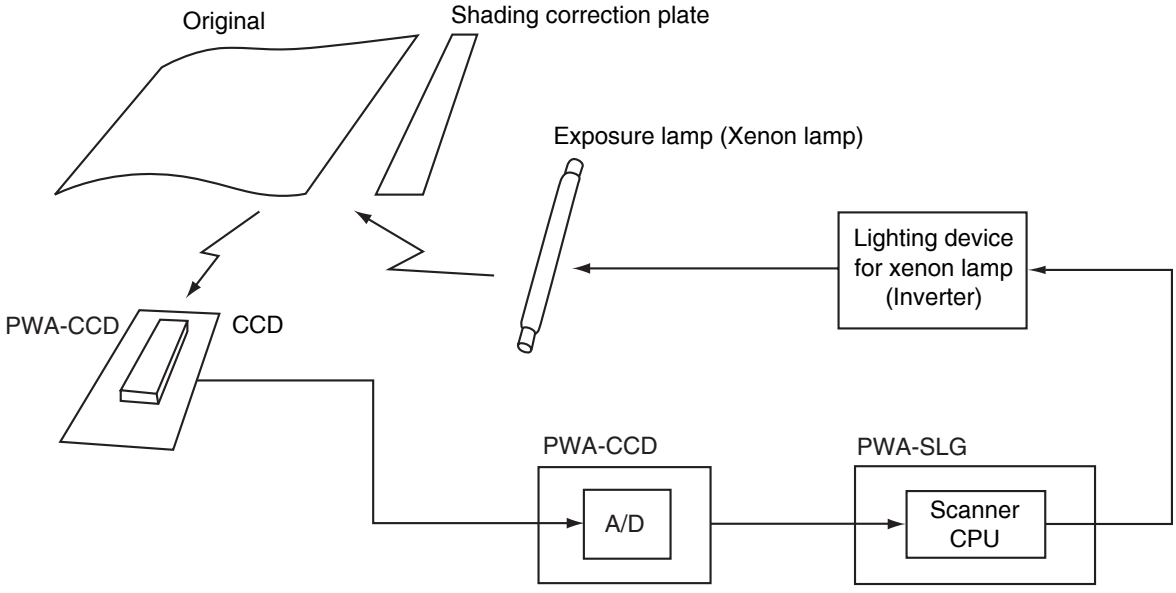


Fig. 6-401

6.4.2 Exposure lamp

External electrode type xenon fluorescent lamp is used as an exposure lamp in this equipment.

(1) Structure

Fluorescer is applied on the inside surface of the lamp pipe (except a part to be an opening) which is filled with the xenon gas.

A pair of the external electrodes covered by the film with the adhesive agent is attached over the pipe.

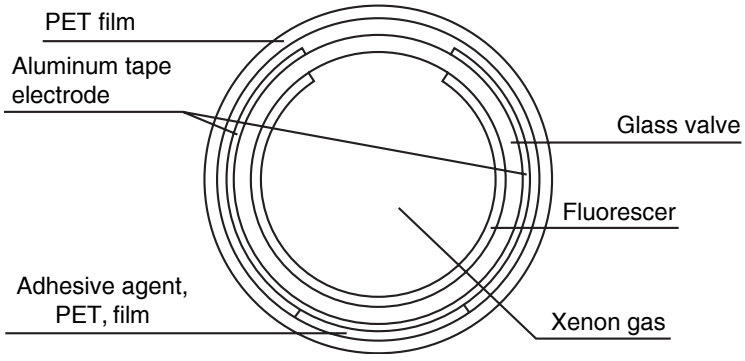
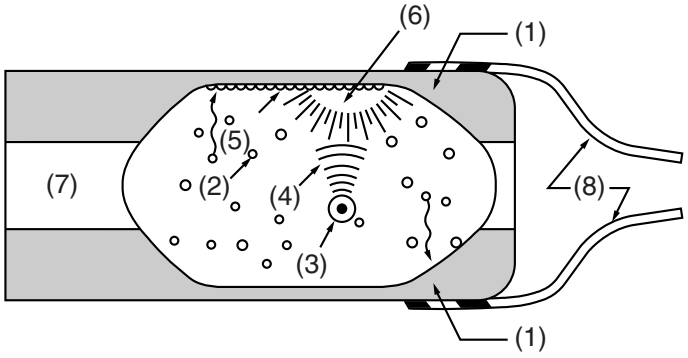


Fig. 6-402

(2) Behavior inside the lamp

The electron inside the pipe is led to the electric field by applying voltage to the pair of the external electrodes, and discharge is started. Electrons then flow and clash with the xenon atom inside the pipe to excite them, and generate the ultraviolet ray. This ultraviolet ray converts the fluorescer into the visible light.



(1) Electrode (2) Electron (3) Xenon atom (4) Ultraviolet ray (5) Fluorescer
(6) Visible light (irradiated from the opening to outside the pipe)
(7) Opening (8) Harness

Fig. 6-403

6.4.3 Control circuit for the exposure lamp

SLG board

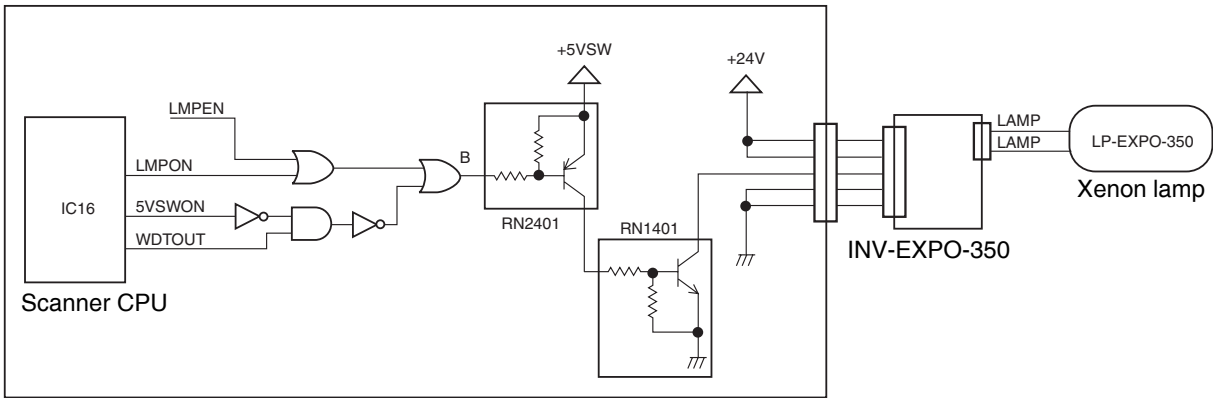


Fig. 6-404

Working conditions

LAMP ON	L	-	-	-	Exposure lamp ON signal	Lamp turns ON at “L”
5VSW ON	L	H	-	-	5V SW ON signal	Controls 5VSW by CPU. Normally “L”
WDTOUT	H	-	L	-	Watchdog timer signal	“L” is output when CPU is out of control
LMPEN	L	-	-	H	Exposure lamp enable signal	Normally “L”
Xenon lamp	ON	OFF				

6.5 General Description of CCD Control

6.5.1 Opto-electronic conversion

A CCD (Charge-Coupled Device) is used to produce electrical signal corresponding to the reflected light amount from the original. CCD is a one-chip opto-electronic conversion device, comprised of several thousand light-receiving elements arranged in a line, each one of them is a few micron square.
This equipment includes a CCD which has 7,450 light-receiving elements.
Each element of the light-receiving section consists of semiconductive layers P and N. When the light irradiates the element, light energy produces a (-) charge in the layer P; the amount of the charge produced is proportional to the energy and irradiating time. The charges produced in the light-receiving section are then sent to the transfer section where they are shifted by transfer clock from left to right as shown in the figure below, and are finally output from the CCD. At this time, to increase the transfer speed of the CCD, image signals in the even-number and odd-number elements are separated and output in parallel via two channels.

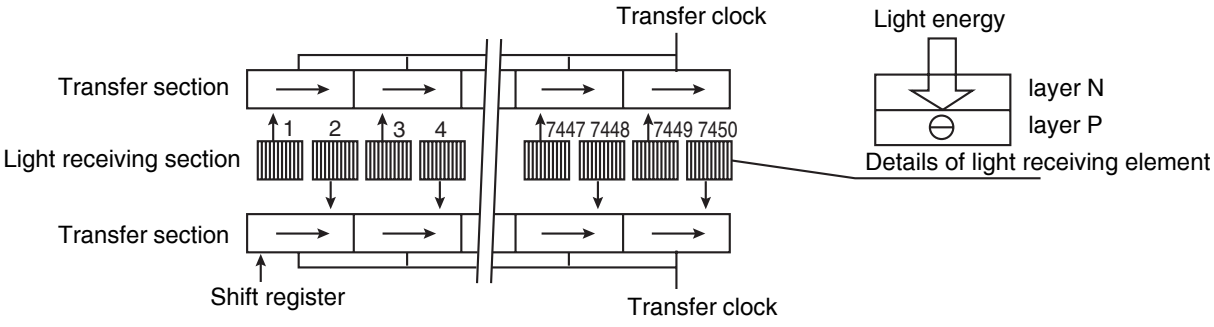


Fig. 6-501

6.5.2 Shading correction

Signal voltages read by the CCD have the following characteristics:

(1) Light source has a variation in its light distribution.
(2) Since the light beam reflected from the original is converged using a lens, the light path is the shortest at the center of the CCD and the longest at ends. This causes difference in the amount of light reaching the CCD (i.e. the light amount is maximum at the CCD center, gradually decreases toward ends).
(3) Each of the 7,450 elements varies in opto-electronic conversion efficiency.

These variation need to be corrected and this correction is referred to as shading correction. Shading correction is performed by applying normalization process using the following formula on the black and white data obtained in advance to correct lighting variance and element variation of the image data.

$$I = k \times \frac{(S - K)}{(W - K)}$$

k : Coefficient
S : Image data before correction
K : Black data (stored in “black” memory)
W : White data (stored in “white” memory)

6.6 Automatic Original Size Detection Circuit

This circuit detects the size of original (standard sizes only) using the reflection type photosensors arranged on the base frame of the scanner unit.

6.6.1 Principle of original size detection

Reflection type photosensors are placed on the base frame of the scanner unit as shown in the Fig. 6-601. Each sensor consists of an infrared Light Emitting Diode (LED) on the light emitting side, and a phototransistor on the light receiving side.

When there is an original on the original glass, light beams from the LEDs are reflected by the original and led to the phototransistors. This means that the presence of the original is detected by the presence of reflection (when scanning black image).

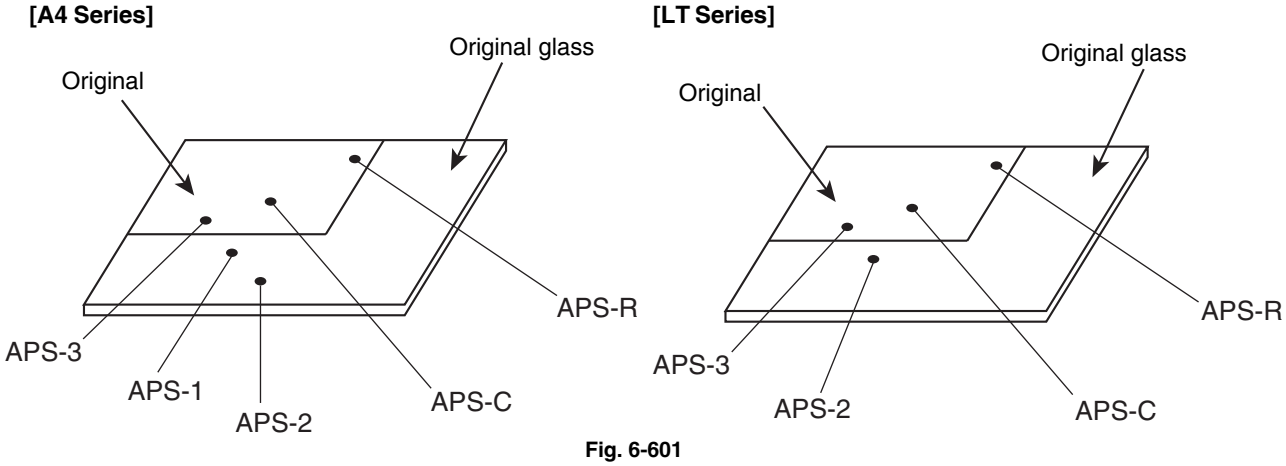


Fig. 6-601

6.6.2 Process of detection of original size

(1) When the equipment is in the original size detection mode, carriage-1 is set at its home position.

(2) When the platen cover is opened, the sensors receive the light reflected from the original and if one of the matrix conditions shown in (4) for original sizes are met, the size of the original is instantly detected.

(3) The output signal from each sensor is input to CPU on the scanning section control PC board to determine the size of the original.

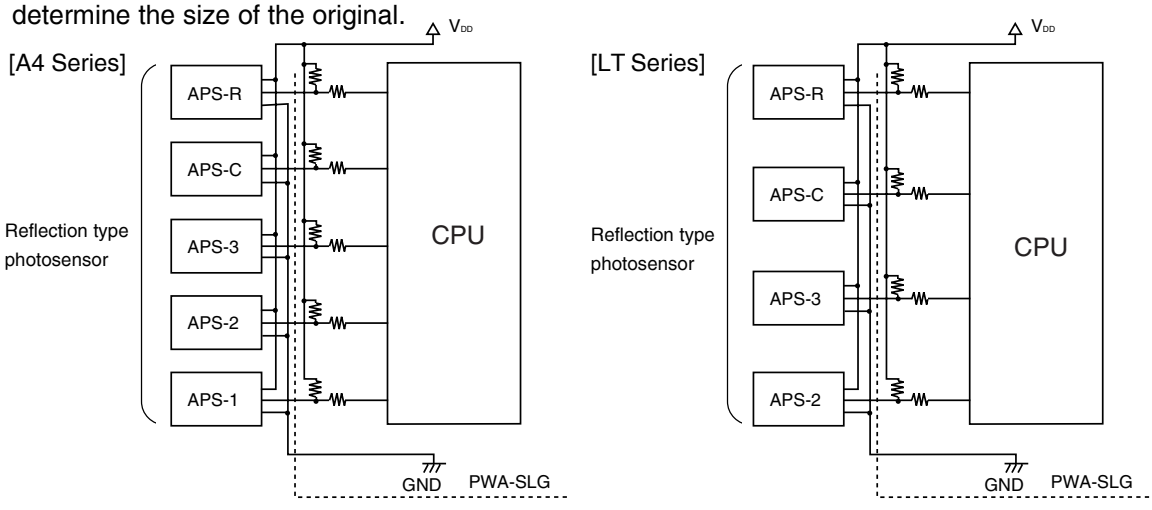
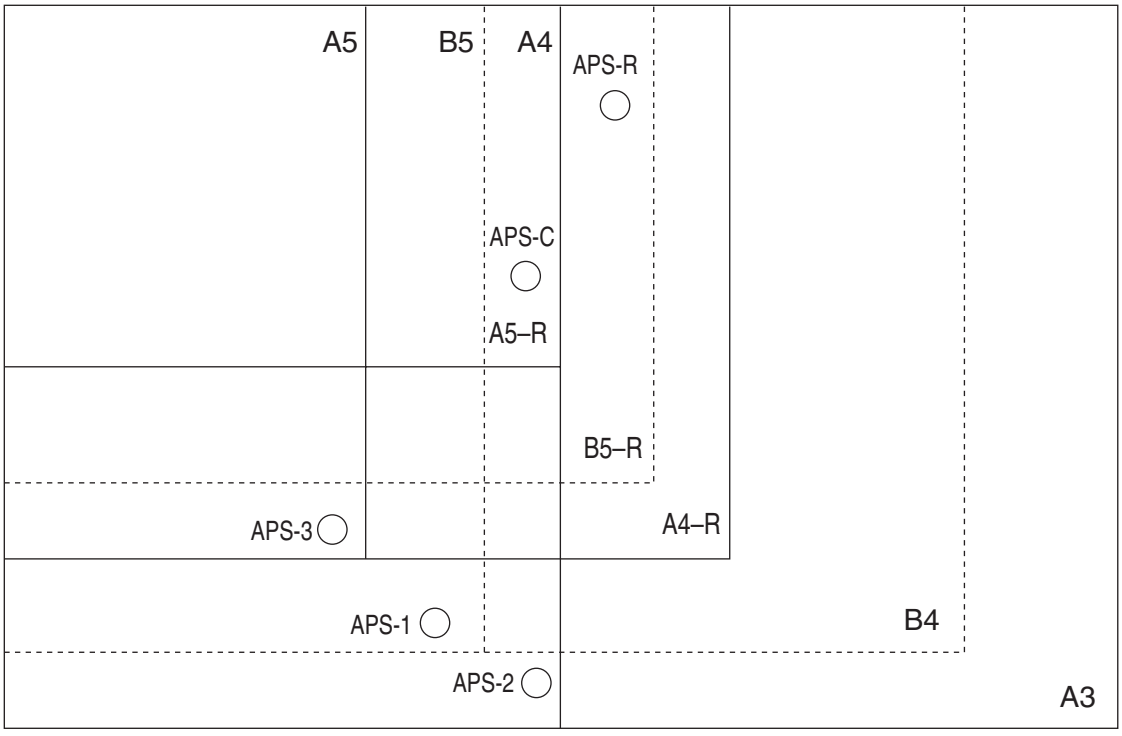


Fig. 6-602 Original size detection circuit

[A4 Series]



[LT Series]

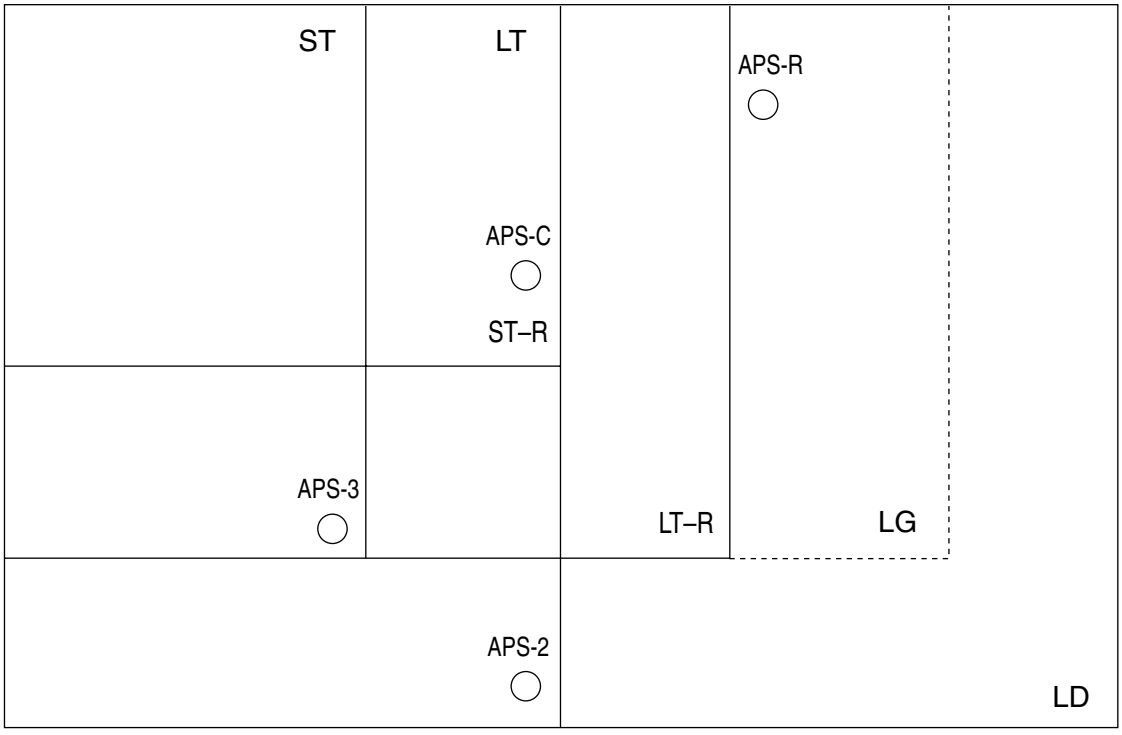


Fig. 6-603 Sensor detection points

(4) Original size is determined by the combination of the signals output from each detection point. Combination charts for size determination of A4 series and LT series are as follows.

[A4 Series]

Size judgement	APS-C	APS-R	APS-1	APS-2	APS-3
A3	0	0	0	0	0
A4	0	1	0	0	0
B4	0	0	0	1	0
B5	1	1	0	1	0
A4-R	0	0	1	1	0
A5	1	1	1	1	0
B5-R	0	0	1	1	1
A5-R	0	1	1	1	1

[LT Series]

Size judgement	APS-C	APS-R	APS-2	APS-3
LD	0	0	0	0
LT	0	1	0	0
LG	0	0	1	0
LT-R	0	1	1	0
ST	1	1	1	0
ST-R	0	1	1	1

Code	Output signal	Original
1	H	Not available
0	L	Available

* When the platen sensor is OFF,
- The followings are determined by output signals from the APS sensors.
  Size (The combination of the signals satisfy any in the above chart)
  : Size is displayed on the control panel and a specific paper or reproduction ratio is selected.
  Size retention (The combination of the signals do not satisfy the above chart)
  : The latest original size recognized (or no original state) until new paper size is recognized.
  No original (Output from all the sensors are “H”.)
  : Reproduction ratio and paper are not selected.
- Size change is always observed and detected.
- The carriage-1 stays at the standby position even if the reproduction ratio changes corresponding to the change of the original size.

* When the platen sensor is ON,
The latest original size (or no original state) recognized right before the platen sensor is turned ON is retained regardless of the status the APS sensor output signals.

About reflection type photosensor

The reflection type photosensor is comprised of an infrared light emitting diode and a phototransistor. It uses pulse modulation to detect an original.

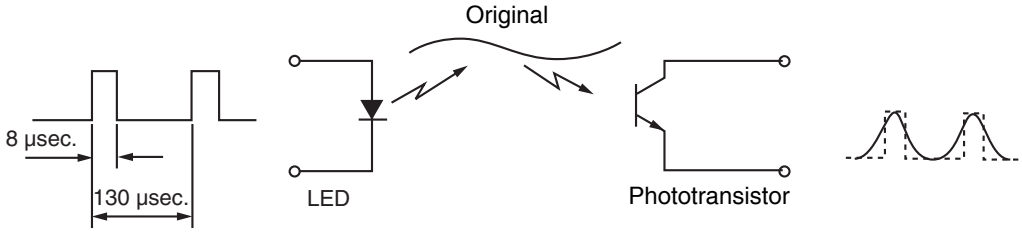


Fig. 6-604

The light emitting diode is driven by a pulse having a 130 µsec. cycle and an 8 µsec. ON time. When the phototransistor receives the same signal as this pulse, it is determined that there is an original. The pulse modulation is performed inside the reflection type phototransistor.

6.7 Disassembly and Replacement

[A] Original glass

(1) Take off the right upper cover (► Chapter 2.5.1 [J]).

(2) Remove 2 screws and take off the fixing bracket.

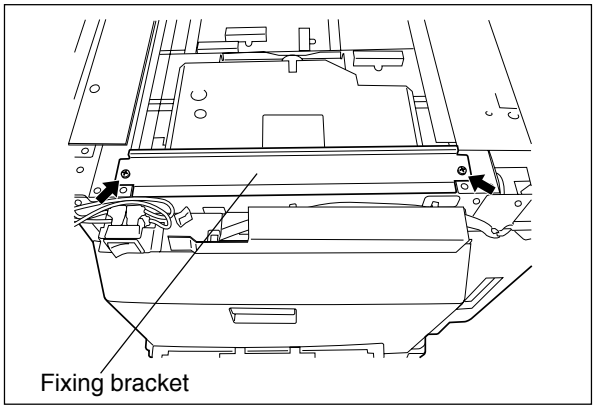


Fig. 6-701

(3) Remove the original glass.

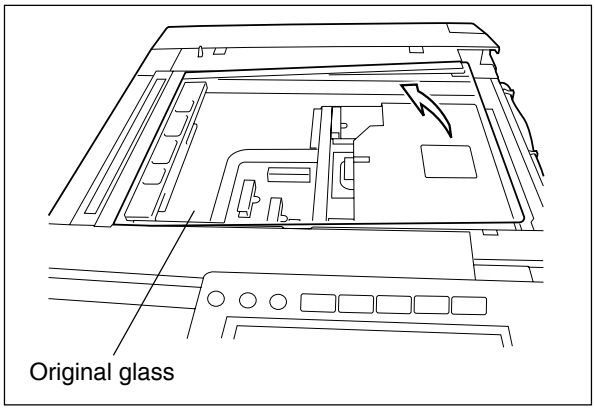


Fig. 6-702

[B] Lens cover

(1) Remove the original glass (► Chapter 6.7 [A]).

(2) Disconnect 1 connector, remove 5 screws and take off the lens cover.

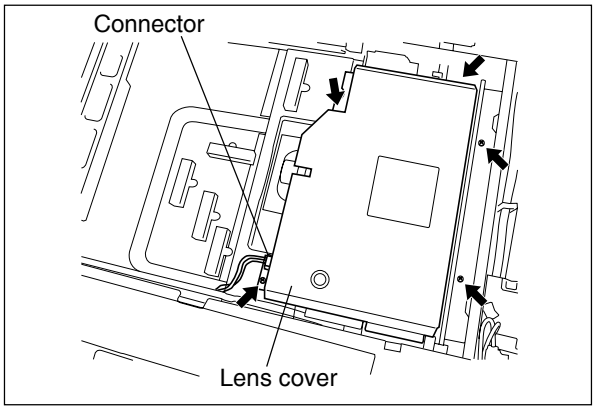


Fig. 6-703

[C] SLG board cooling fan

(1) Take off the lens cover (► Chapter 6.7 [B]).

(2) Disconnect 1 connector, remove 2 screws and take off the SLG board cooling fan.

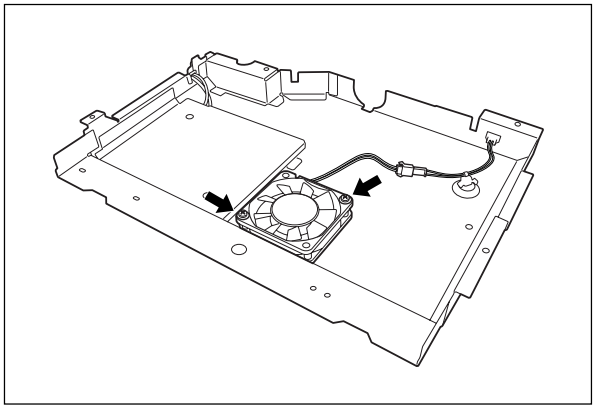


Fig. 6-704

[D] Automatic original detection sensor (APS sensor)

(D-1) A4 series

(1) Remove the original glass (► Chapter 6.7 [A]).

(2) Disconnect 1 connector and remove 1 screw for each APS sensor. Take off 5 APS sensors.

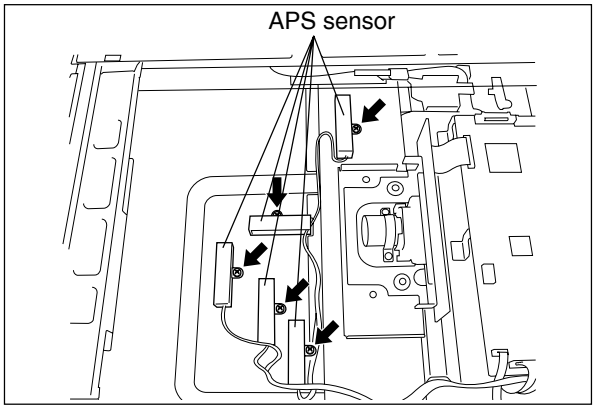


Fig. 6-705-1

(D-2) LT series

(1) Remove the original glass (► Chapter 6.7 [A]).

(2) Disconnect 1 connector and remove 1 screw for each APS sensor. Take off 4 APS sensors.

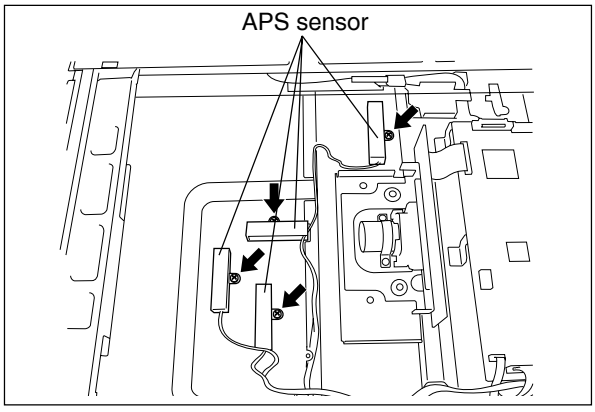


Fig. 6-705-2

[E] Exposure lamp

(1) Remove the original glass and take off the front upper cover (► Chapters 6.7 [A], 2.5.1 [I]).

(2) Move the carriage-1 to the center position where the side of the frame is cut out.

(3) Disconnect the connector of the exposure lamp.

Note: When disconnecting the connector, pay attention not to give load to the carriage frame.

(4) Remove 1 screw.

(5) Lift up the front side of the exposure lamp and take off by sliding it.

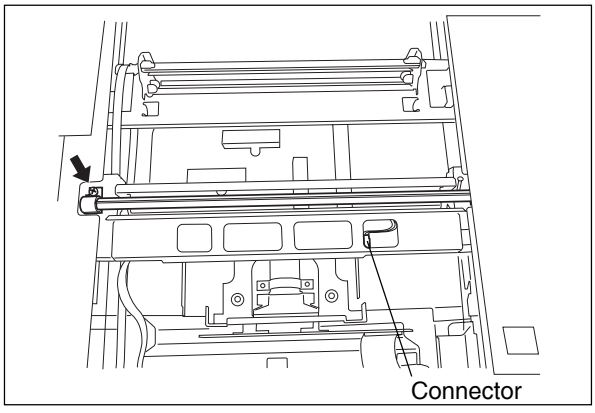


Fig. 6-706

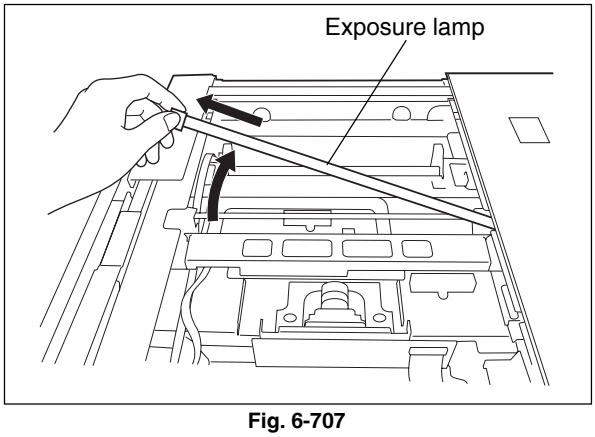


Fig. 6-707

[F] Lens unit

(1) Remove the lens cover (► Chapter 6.7 [B]).

(2) Disconnect 1 connector and remove 5 screws. Then remove 2 screws and 2 ground wires and take off the lens unit.

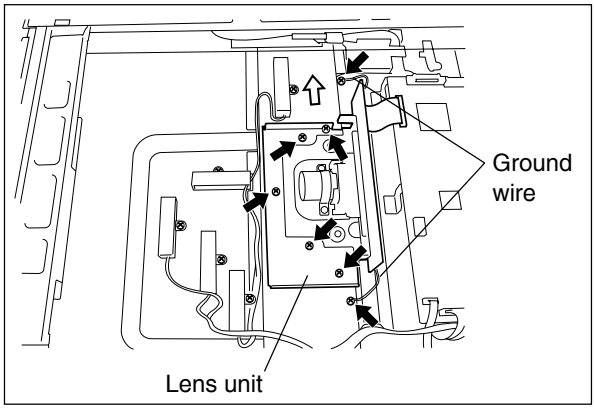


Fig. 6-708

Notes: 1. When installing the lens unit, fix it while pushing it to the direction of the white arrow.

2. For adjustment, refer to "3.9.2 Lens Unit" in the Service Handbook.

3. Do not touch 4 screws shown with the arrows when replacing the lens unit.

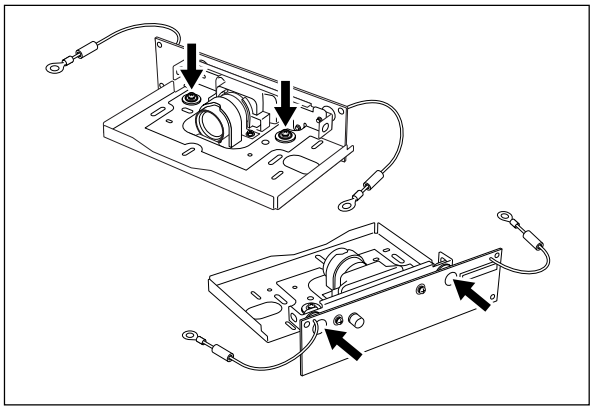


Fig. 6-709

4. Handle the unit with care. Do not touch the adjusted area and lens. (Hold the unit as the right figure.)

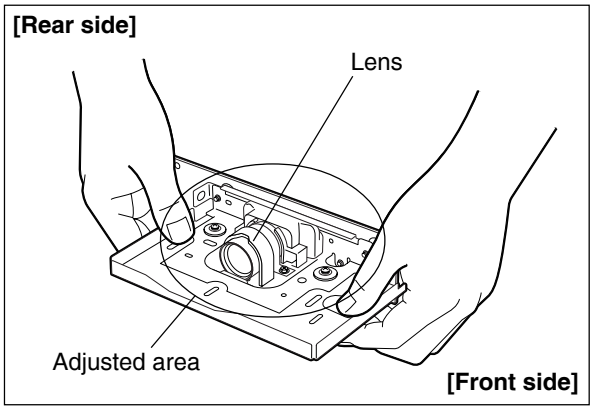


Fig. 6-710

[G] Scan motor

(1) Take off the upper rear cover (► Chapter 2.5.1 [Q]).

(2) Take off the rear cover (► Chapter 2.5.1 [P]).

(3) Disconnect 1 connector.

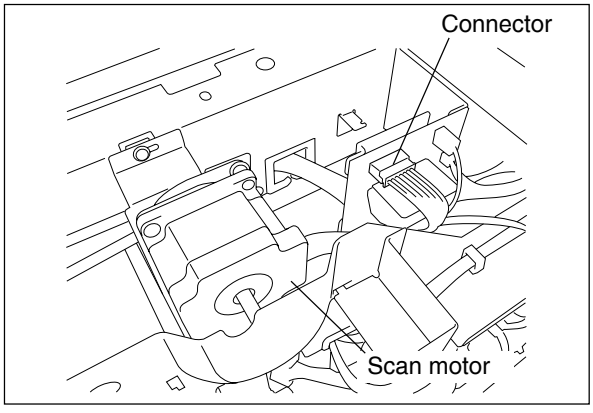


Fig. 6-711

(4) Remove 3 screws and take off the scan motor with the whole bracket.

Note: When installing the scan motor, fix it with a belt tension jig (spring).

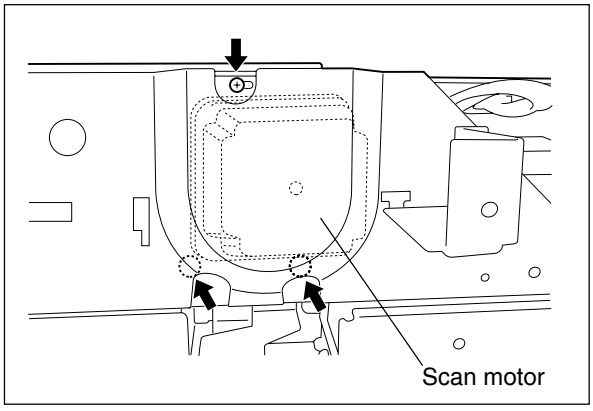


Fig. 6-712

Notes: When installing the scan motor, use the belt tension jig (spring). The procedure is as follows.

1. Fix the screw A.
2. Temporarily fix the screw B and C.
3. Hook the belt tension jig to the motor bracket and the flame.
4. The scan motor is pulled by the belt tension jig. Fix the screw B and then C at the stopped position.
5. Remove the belt tension jig.

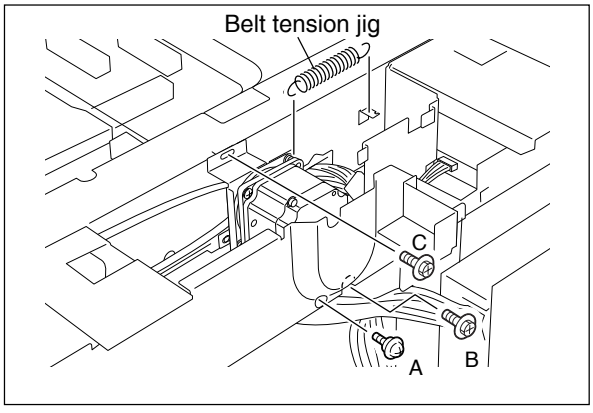


Fig. 6-713

[H] Carriages-1 and -2

(1) Remove the original glass and take off the upper rear cover (► Chapters 6.7 [A], 2.5.1 [Q]).

(2) Move the carriage and position the holes of the carriage to the holes of the frame.

(3) Remove 2 screws and take off the brackets fixing the carriage-1 to the wire.

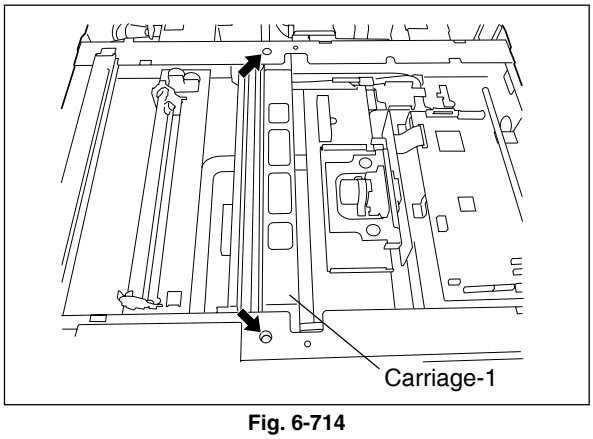


Fig. 6-714

(4) Remove the square seal fixing the lamp cable to the base. Release the harness from the harness clamp. Disconnect the connector of the lamp cable from the SLG board.

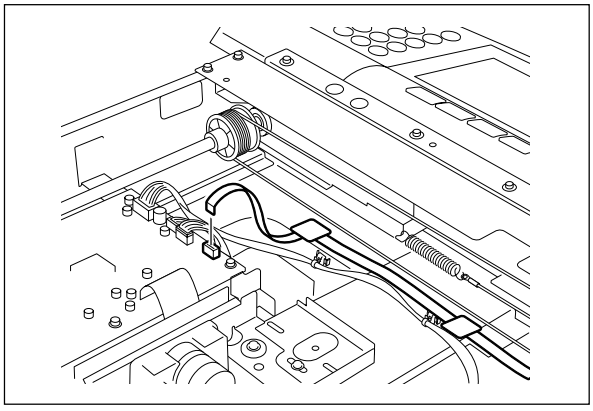


Fig. 6-715

(5) Take off the carriage-1 while inclining it.

Note: When replacing the mirror-1, replace the carriage-1 together with mirror-1.
Mirror-1 should not be removed.

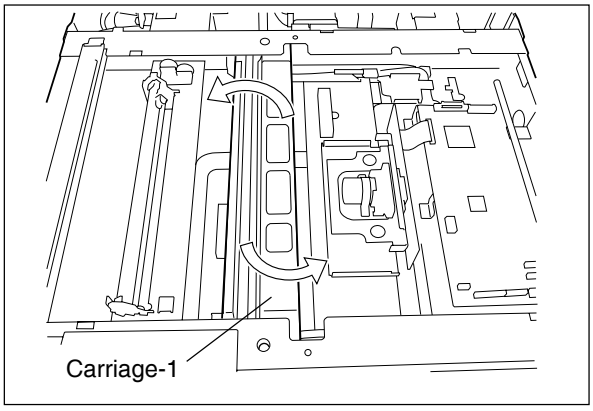


Fig. 6-716

Notes: 1. When installing carriage-1, fix the bracket temporarily at the position (A). Then move it to the direction (B), push it to the end and fix securely.
2. Refer to the Service Handbook for more details.

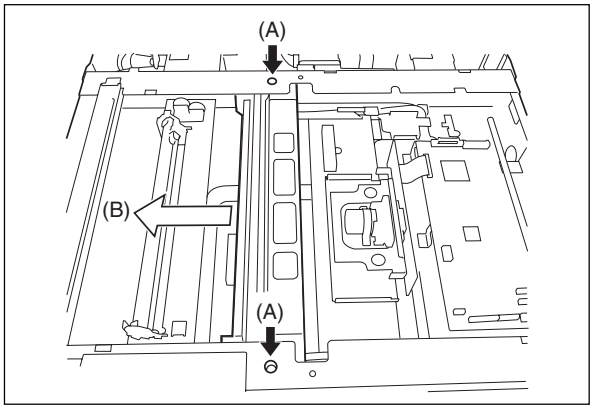


Fig. 6-717

(6) Remove 2 screws and take off the inverter board.

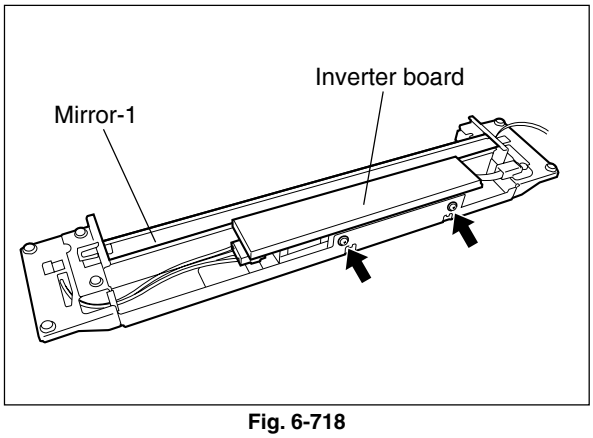


Fig. 6-718

(7) Attach the wire holder jigs to the pulleys to prevent the wires from loosening.

Note: Refer to "3.9 Adjustment of the Scanner Section" in the Service Handbook for the direction of the wire holder jigs.

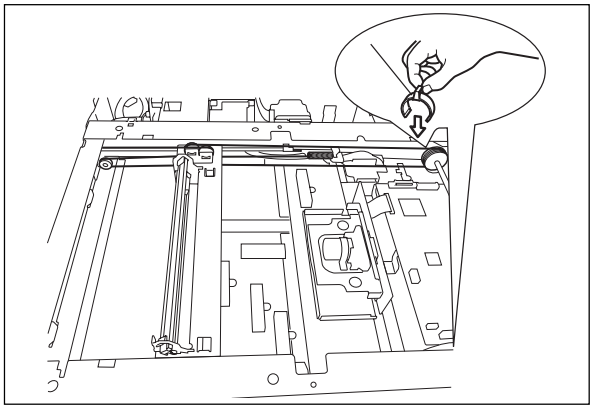


Fig. 6-719

(8) Detach the tension springs of the front and rear sides.

(9) Remove the carriage wires.

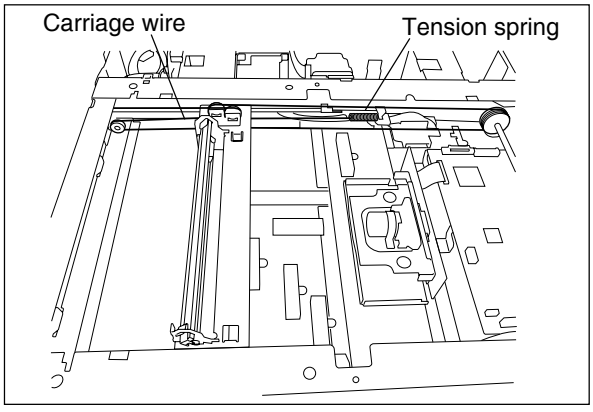


Fig. 6-720

(10) Take off the carriage-2 while its corner is pushed into the window of the rail and inclining the carriage.

Note: When replacing the mirrors-2 and -3, replace the carriage-2 together with mirrors-2 and -3. Mirrors-2 and -3 should not be removed.

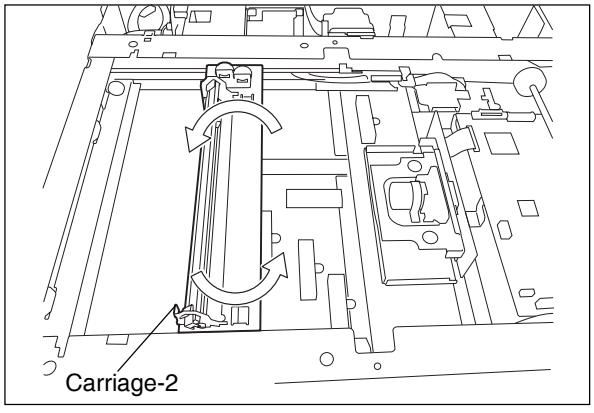


Fig. 6-721

Notes: 1. When installing carriage-2, fix the bracket temporarily at the position (A). Then move it to the direction (B), push it to the end and fix securely.

2. Refer to the Service Handbook for more details.

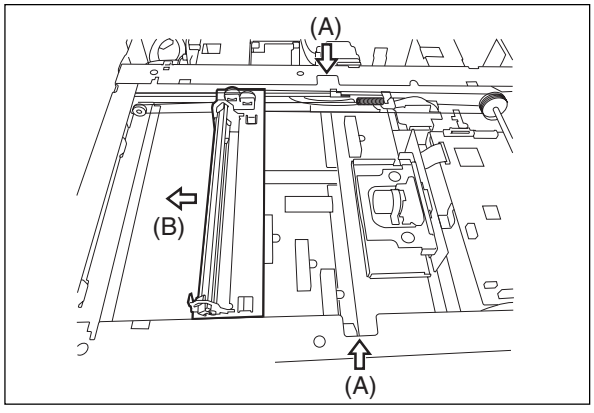


Fig. 6-722

[I] Platen sensor

(1) Take off the upper rear cover (► Chapter 2.5.1 [Q]).

(2) Disconnect 1 connector. Release the latches and take off the platen sensor.

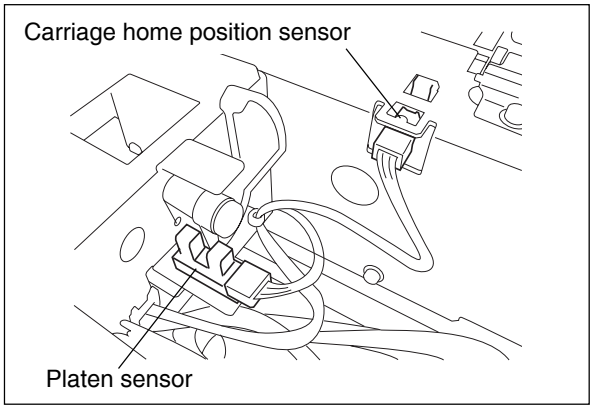


Fig. 6-723

[J] Carriage home position sensor

(1) Take off the upper rear cover (► Chapter 2.5.1 [Q]).

(2) Disconnect 1 connector. Release the latches and take off the carriage home position sensor.

[K] Scanning section control PC board (SLG board)

(1) Take off the lens cover (► Chapter 6.7 [B]).

(2) Disconnect 7 connectors, remove 6 screws and take off the SLG board.

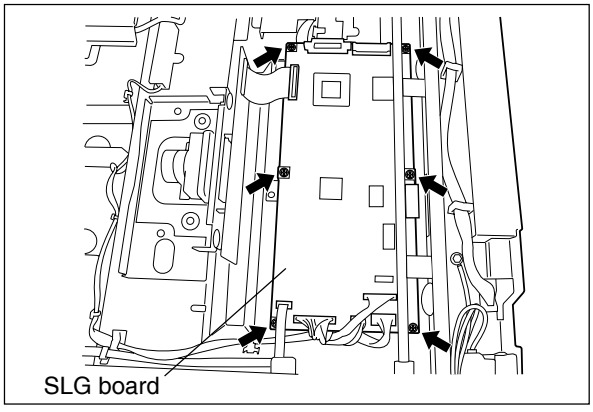


Fig. 6-724

7. IMAGE PROCESSING

7.1 General Description

The following diagram shows the process of this equipment from scanning of original to writing data on the photoconductive drum surface.

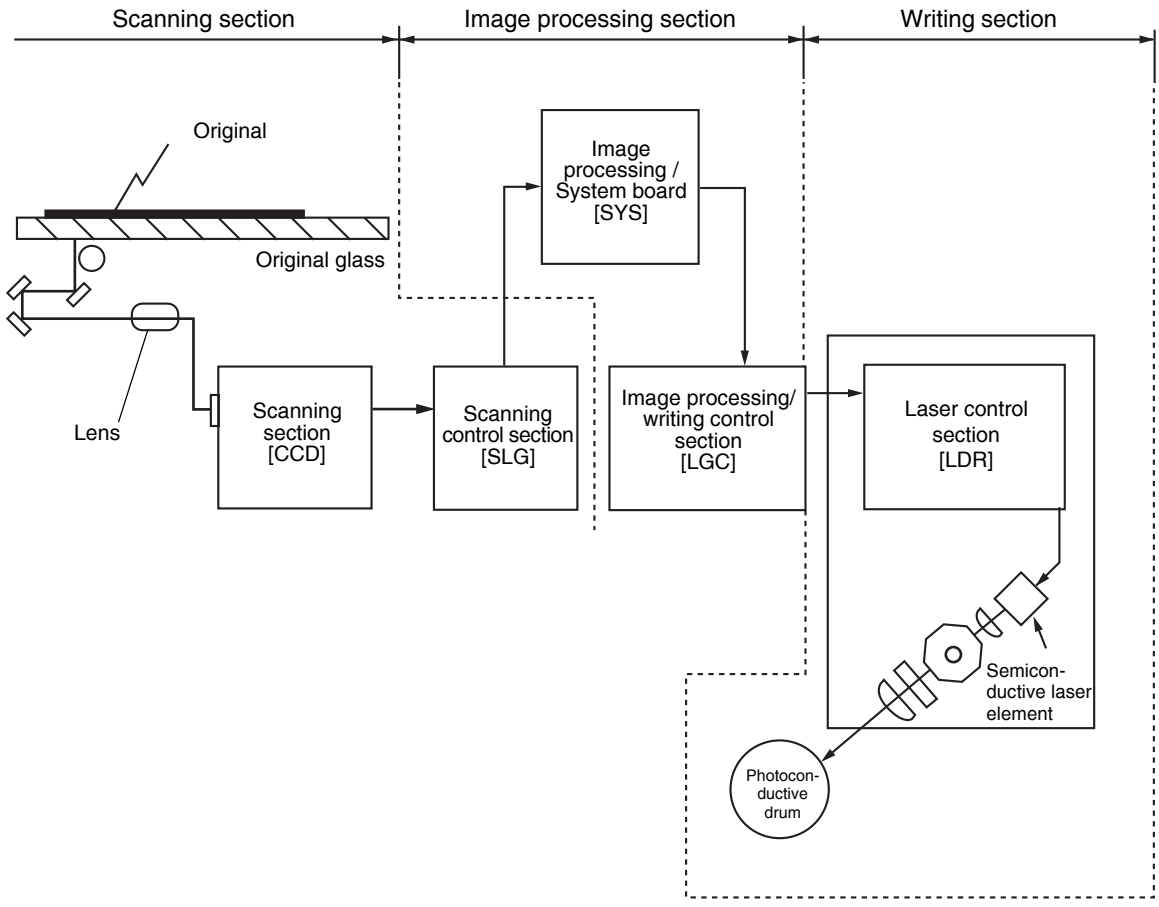


Fig. 7-101

The followings are the boards used for image processing.

Board	Function	
SYS board (PWA-F-SYS-350)	PPC	ACS, color conversion, high quality image processing, image memory editing, rectangular area signal generation, editing processing, gamma correction, gradation processing, compression/expansion and black component generation
	PRT/ SCN	Scanner high quality image processing, printer high quality image processing, black over print, pure black/pure gray, chroma adjustment and brightness adjustment
LGC board (PWA-F-LGC-350)	Smoothing processing, image area control and laser related control	

Image of an original placed on the original glass is scanned by the optical system. The CCD (Charge Coupled Device) reads the optical image signals and converts them into the electrical signals. The electrical signals are amplified and undergo analog-to-digital conversion, then are changed into digital signals. Shading correction (correction of variance in CCD elements and the light source) is performed and the digital signal is output as an image signal from the scanning section.

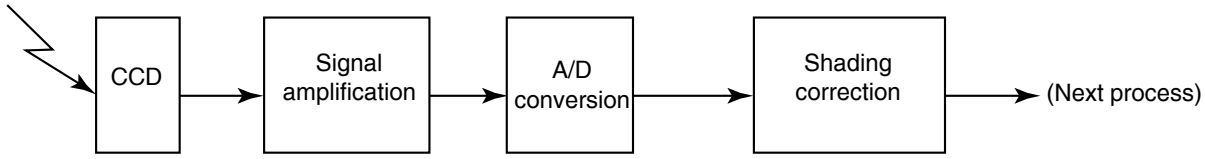


Fig. 7-102

The image processing section inputs the image signal from the scanning section and applies various image processing on the signal, then transmits the output result to the writing section.
Images are processed by the SYS board (PWA-F-SYS-350) and LGC board (PWA-F-LGC-350) in this equipment. Also, the image signals read with the Scanning Function and the printer image signals are processed in the SYS board.

7.2 Configuration

The Fig. 7-201 shows the image processing section of this equipment.

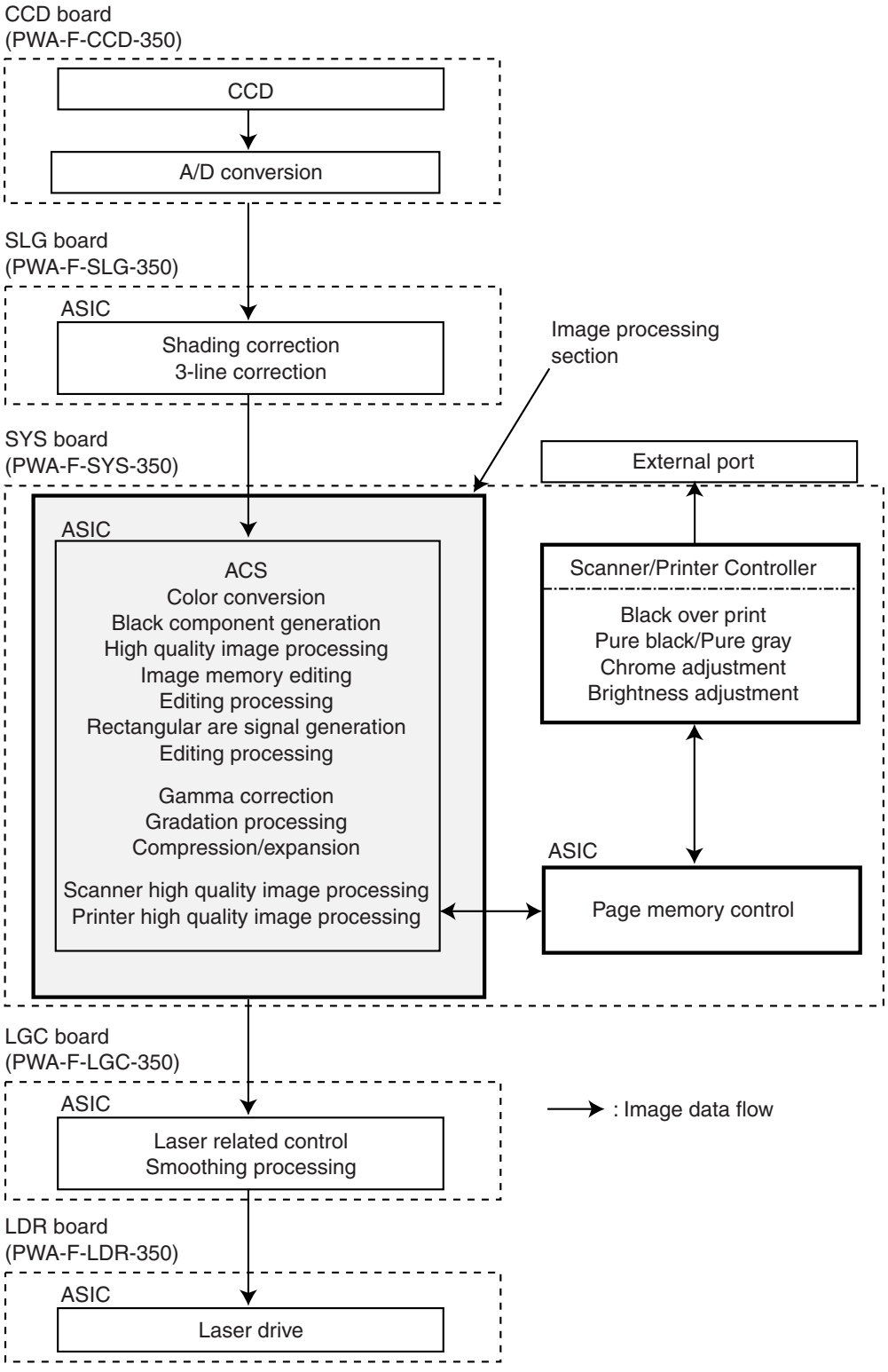


Fig. 7-201

7.3 SYS Board (PWA-F-SYS-350)

7.3.1 Features

(1) The image processing section on the SYS board is controlled by the CPU on the SYS board.

(2) The image processing section on the SYS board realizes the following when functioning the copier:

- ACS
- Color conversion (CMY image data processing)
- Black component generation
- High quality image processing
- Image memory editing
- Rectangular area signal generation
- Editing processing
- Gamma correction
- Gradation processing
- Compression/expansion

(3) The image processing section on the SYS board realizes the following when functioning the scanner and printer:

- Scanner high quality image processing
- Printer high quality image processing
- Black over print (Post Script)
- Pure black / Pure gray (Post Script)
- Chroma adjustment (PCL5C)
- Brightness adjustment (PCL5C)

7.3.2 Functions of image processing circuit

The image processing section on the SYS board realizes the followings:

(1) ACS (Auto Color Selection)

This function determines whether the original to be scanned is colored or monochrome, based on the analysis of the R, G and B signals output from the CCD.

(2) Color conversion (CMY image data processing)

When functioning the copier, the RGB image data is converted to CMY image data. (When functioning the scanner, it is converted to RGB image data.)

The image data taken in by the scanner represents the intensities of reflection from the three primary colors of light (Red, Green and Blue). These RGB values are then color-converted to the respective amounts of toners corresponding to the three colors (Yellow, Magenta and Cyan) for printing (=CMY image data processing).

(3) Black component generation

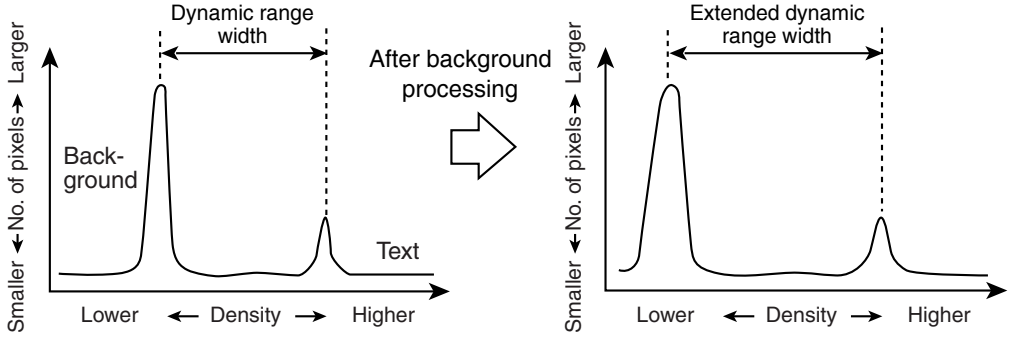
K (Black) signal is generated from the CMY image data. Based on this K signal, the CMY image data is corrected to suppress hue on reproducing grays or to make the black look more real.

(4) High quality image processing

(a) Background processing function

By using the background adjustment function while manually adjusting the image density, undesirable background of the original can be removed if any, and some necessary but disappeared background can be recovered. By using this function, it is possible to cut the background density down when copying originals which have a certain level of background density, such as newspapers.

<Example>



Histogram

Fig. 7-301

(b) Image discrimination

By determining the magnitude of density variation in a block (n x n dot), the target pixels are judged whether they are text or photograph. If they are determined to be text, they are further judged whether they are black or color text, using the differences in the levels of CMY signals.

(c) Filtering

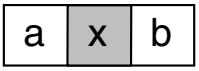
This function is enabled by low-pass filter processing and high-pass filter processing.

- Low-pass filter processing

  This processing removes image/electrical noise and decreases moire by performing averaging operation between the image signals of the targeted pixel and those of the neighboring pixels to enhance the reproducibility of original.

  <Example> Density of the targeted pixel position is X. Density of pixel positions at front and back of the targeted pixel are “a” and “b” respectively. X is converted to X’ through the low pass filtering.

  When the matrix is (3 x 1):

  $$x' = \frac{a + b + x}{3}$$

  The above averaging operation is performed for all the pixels to accomplish the high reproducibility of original.

  (The following is the case that the low pass filtering is applied on the primary scanning pixel.)

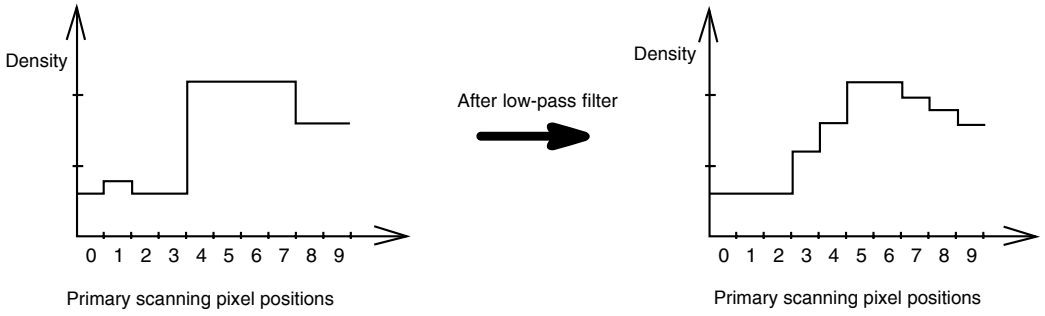

Density
0 1 2 3 4 5 6 7 8 9
Primary scanning pixel positions
After low-pass filter
Density
0 1 2 3 4 5 6 7 8 9
Primary scanning pixel positions

Fig. 7-302

- High-pass filter processing

  Character outline blurs when the original, such as text, with big difference in density among the pixels is optically scanned and output from the CCD. Characteristic of the lens and other factors cause this phenomenon. In this equipment, processing such as edge enhancement is applied between the targeted pixel and the neighboring pixels to eliminate this phenomenon and realize high reproducibility of original.

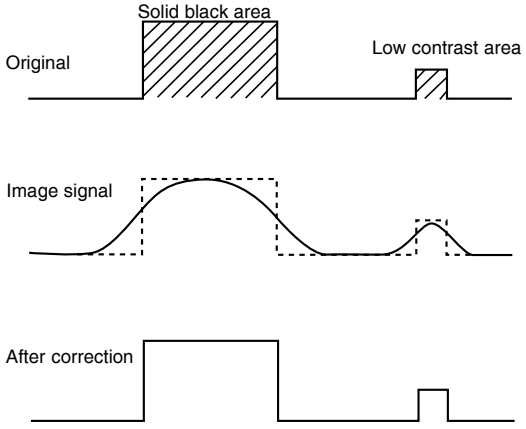


Fig. 7-303

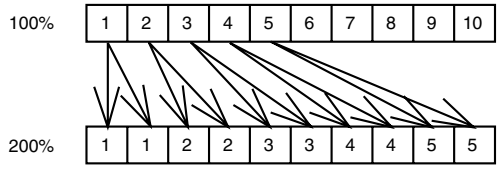
(5) Image memory editing

This function performs editing such as enlargement/reduction, mirror imaging, etc., by using a line memory. Pixel data for one line in the primary scanning direction is stored in the line memory and the memory is renewed at each line.

(a) Enlargement/Reduction

Enlargment/Reduction is accomplished by using the line memory control function in the process of the image processing operation.

<Example> Enlargement



<Example> Reduction

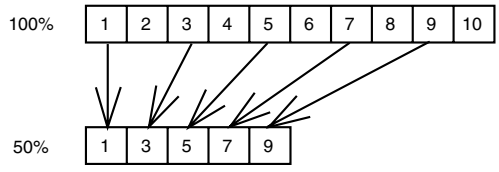


Fig. 7-304

(b) Mirror imaging

This is accomplished by reading and outputting data from its end.

(6) Rectangular area signal generation

When a rectangular coordinate position is selected, the corresponding rectangular area signals are generated. Using these signals, various edit processing related to the area specification can be performed.

(7) Editing processing

This function performs trimming and masking.

(a) Trimming

Using rectangular area signals, the image signals inside the rectangular area are left and the other image signals are eliminated.

(b) Masking

Using rectangular area signals, the image data inside the rectangular area are erased.

(8) Gamma correction

This function corrects the input/output characteristics of the scanner/printer and adjusts the image signals so that the input/output characteristics would match with the copy mode.

(9) Gradation processing

In case of color copying, this function switches the type of gradation processing depending on the copy mode: A type which selects the printer characteristics giving the priority to resolution such as for text data, and another which selects the printer characteristics giving the priority to reproducibility of gradation such as for photographic images.

In case of black copying, this function selects the gradation processing which reproduces the halftone image such as photograph more precisely. Also the gradation processing which makes text data clearer is selected in black copying mode.

(10) Compression/expansion

To lessen the data amount of the color image signals, this function effects the compression/expansion on the data.

(11) Scanner high quality image processing

This function corrects the image signals scanned by the scanner and reproduces them in a higher image quality.

(12) Printer high quality image processing

This function reproduces the image signals output from the printer controller in a higher image quality.

(13) Black over print (Post Script)

When black data of text or graphic object are formed on a certain background with no written data underneath them, the color of the paper comes out around the black data when “out-of-color registration” is occurring. To prevent this phenomenon, this process enables to keep the background color around the black data formed as a part of the text or the graphic object on the printer data.

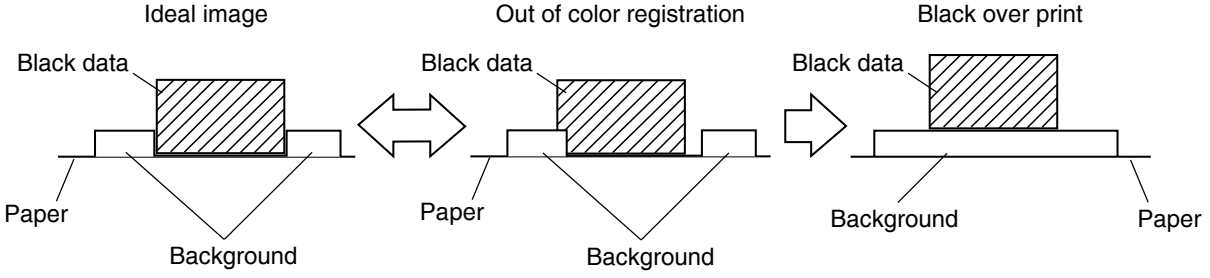


Fig. 7-305

(14) Pure black/Pure gray (Post Script)

This function is to printout the text and graphics formed as black data with black toner only on the printer data, not using 4 color toner. The gray text/graphics are also printed out with black toner only.

(15) Chroma adjustment (PCL5C)

This function adjusts chromaticness of the printer data.

(16) Brightness adjustment (PCL5C)

This function adjusts brightness of the printer data.

7.4 LGC Board (PWA-F-LGC-350)

7.4.1 Features

(1) The image processing ASIC on the LGC board is controlled by CPU mounted on the LGC board.

(2) The image processing functions of the LGC board realizes the followings:

- Smoothing processing
- Image area control
- Laser related control

7.4.2 Functions of image processing circuit

An image processing ASIC mounted on the LGC board enables the following functions:

(1) Smoothing processing

This function removes jaggy and smoothes character outline of images and output them.

(2) Image area control

This function sets the effective image area in horizontal and vertical directions to be output.

(3) Laser related control

This function performs the APC (Auto Power Control).

7.5 Laser Driving PC Board (LDR Board)

Image signals processed on the LGC board are processed by ASIC for writing control and LDR board. The signal is then laser controlled and written on the drum.

(1) Setting of effective image area ..... • Top, bottom, left and right margins

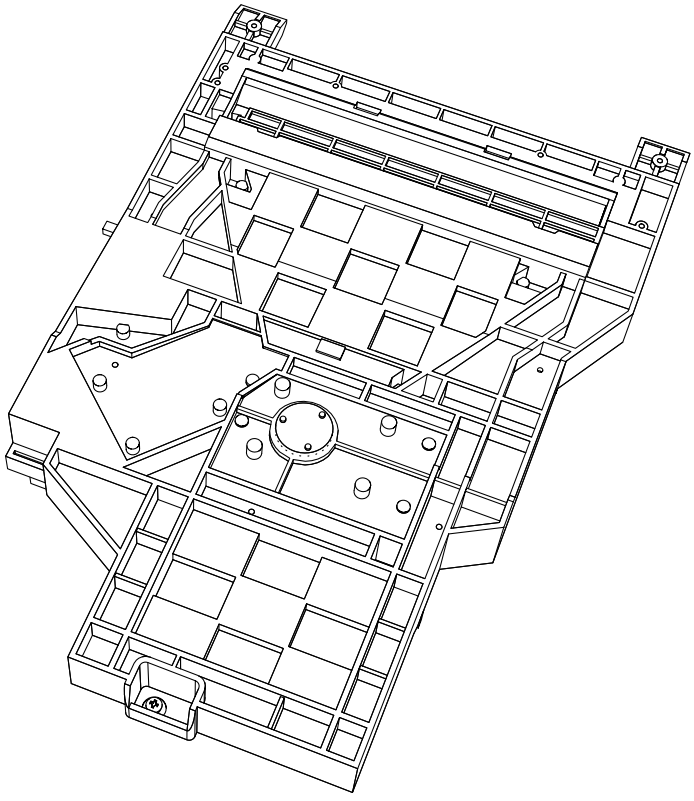
(2) Horizontal synchronization signal (HSYNC) ..... clock generation section • Reference clock signal in the printer section synchronized with HSYNC and its signal.

(3) Laser drive section ..... • ON/OFF control of the semiconductive laser and APC (Auto Power Control).

8. LASER OPTICAL UNIT

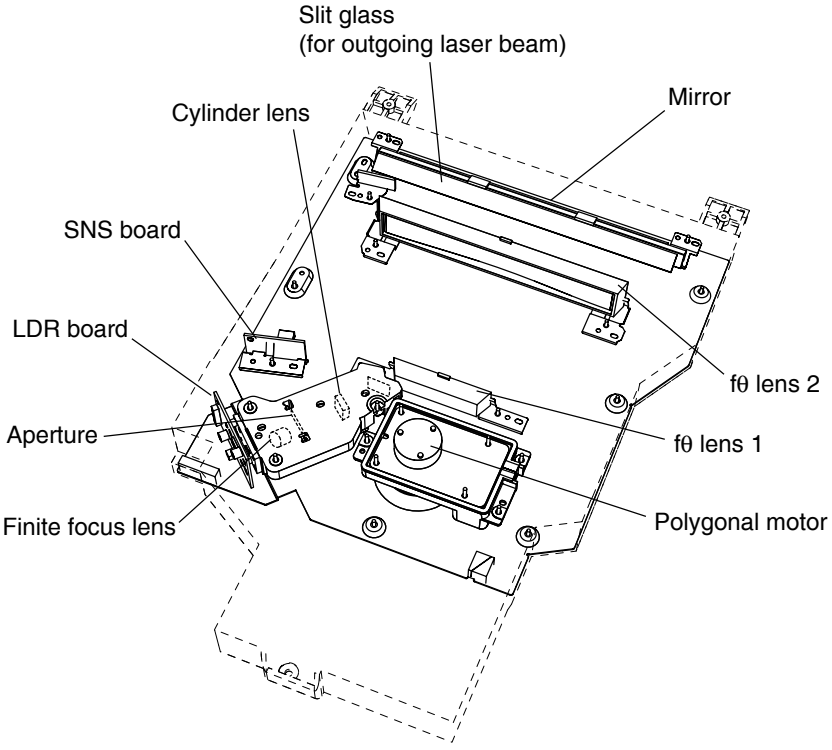
8.1 General Description

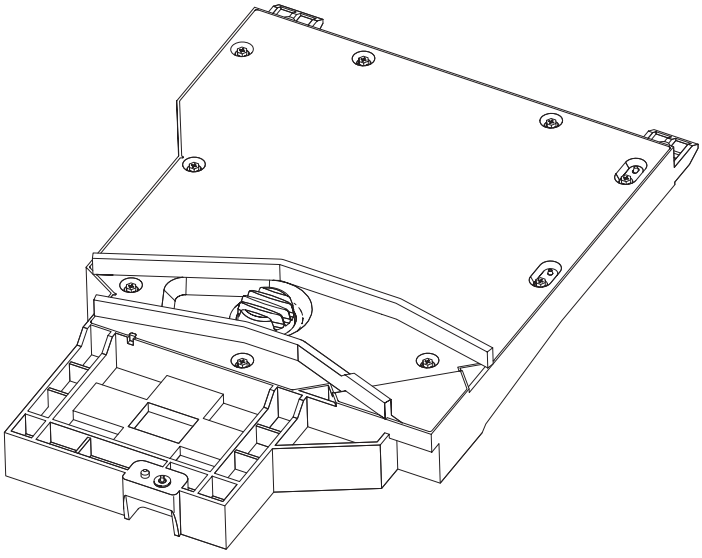
The laser optical unit radiates the laser beam onto the photoconductive drum responding to the digital image signals transmitted from the scanner, printer controller, etc. to create the latent image. Image signal is converted into the light emission signal of the laser diode on the laser driving PC board, then radiated on the drum through the optical elements such as cylinder lenses, polygonal mirror and fθ lens. The unit must not be disassembled in the field as they are very sensitive to dust and finely adjusted at the factory.



[Laser Optical Unit Overview]

Fig. 8-101





[Writing Section Overview]

Fig. 8-102

8.2 Structure

(1) Laser emission Unit

This unit consists of the laser diode, finite focus lens, aperture and cylinder lens.

a. Laser diode

This laser diode features low droop, small laser variation and low threshold current.

Aperture determines the shape of the laser beam at laser emission position of the primary scanning and secondary scanning.

Laser diode radiates the laser beams responding to the laser emission control (ON/OFF) signals from the laser driving PC board. Laser beams which passed through the finite focus lens are focused on the drum surface.

b. CAUTION

The beam of the semiconductor laser is very weak (about 10 mW), but focused parallel rays creates great energy which is hazardous.

Some materials of the components of the laser optical unit are metal. Since the unit is in a sealed container, there is no danger of laser leakage during normal operation.

Note: Laser beam is not visible. Pay the closest attention when handling the laser unit components or performing operations such as adjustment of the laser beam, and this kind of operations are very dangerous and must be performed only by specially trained staff.

The warning label shown below is attached on the left side of the upper inner cover.

DANGER-CLASS 3B INVISIBLE LASER RADIATION WHEN OPTICAL UNIT OPEN OR DRUM UNIT REMOVED AND INTERLOCK DEFEATED. AVOID DIRECT EXPOSURE TO BEAM.
VORSICHT-KLASSE 3B UNSICHTBARE LASERSTRAHLUNG, WENN DIE ABDECKUNG GEÖFFNET ODER DIE TROMMEL ENTFERNT UND DIE VERRIEGELUNG UNWIRKSAM GEMACHT WIRD. NICHT DIREKT DEM STRAHL AUSSETZEN.
DANGER-CLASSE 3B RAYON LASER INVISIBLE LORSQUE LE BLOC OPTIQUE EST OUVERT, LE TAMBOUR RETIRE ET LE VERROUILLAGE HORS D'USAGE. EVITER L'EXPOSITION DIRECTE AU RAYON.
PELIGRO-RADIACION INVISIBLE DE LASER CLASE 3B CUANDO LA UNIDAD OPTICA ESTA ABIERTA O LA UNIDAD DEL CILINDRO ES RETIRADA Y CUANDO EL INTERRUPTOR DE SEGURIDAD ESTA DESACTIVADO. EVITE EXPOSICION DIRECTA AL RAYO.
危険-ドラムユニットを外したり光学ユニットを開けたときドアスイッチを無効にするとクラス3Bの不可視レーザー放射の恐れあり。ビームへの直接暴露を避けよ。
>PS<

Fig. 8-201

[CAUTION]

- Do not approach tools near the path of the laser beam.
- Take off your watches, rings, bracelets, etc. before handling the unit.

(2) Polygonal motor unit

This unit consists of the polygonal motor, polygonal mirror and polygonal mirror cover.

a. Polygonal motor

This motor rotates the polygonal mirror in high speed.

The DC motor controls the rotation speed of the mirror motor as follows:

During ready : 10,000.00 rpm

During printing : 36,734.37 rpm (600dpi)

: 37,322.12 rpm
(FAX 15.4x16.0dot/mm)

: 35,922.54 rpm
(FAX 16.0x15.4dot/mm)

b. Polygonal mirror

One laser beam emitted from the laser diode is reflected by this mirror. As the polygonal mirror is rotated by the polygonal motor, the reflected laser light moves in sync with the rotation. The direction of the movement is the primary scanning direction of the image. One scan is performed on one plane of the polygonal mirror.

As the polygonal mirror has eight planes, eight scans are performed in one rotation of the polygonal mirror.

c. Polygonal mirror cover

Polygonal mirror cover reduces the windage loss and noise, prevents adhesion of foreign matters onto the mirror surface and releases heat.

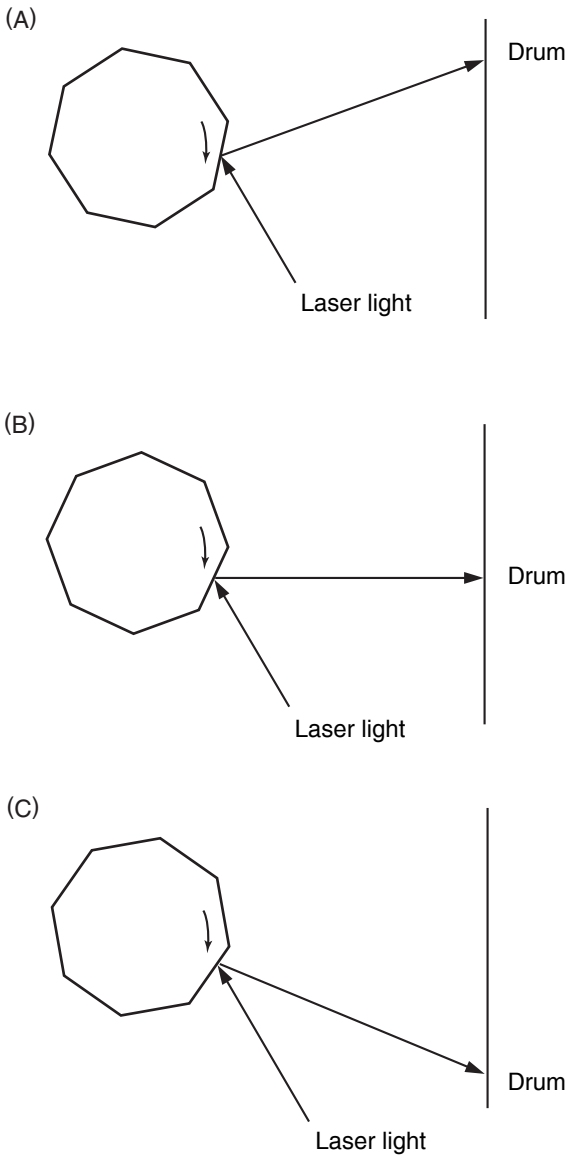


Fig. 8-202

One scan is completed by completion of steps (A) to (C). One scan is performed on one plane of the polygonal-mirror. Eight scans can be made with one rotation of the polygonal mirror.

(3) fθ lenses 1 and 2

These two lenses perform the following adjustment on the laser beams reflected by the polygonal mirror.

a. Uniform-velocity scanning

Since the polygonal mirror is rotating at a uniform velocity, the laser beam reflected from the mirror scans over the drum surface at a uniform angular velocity; namely, the pitch between the dots on the drum is wider at both ends than at the center of the scanning range. The fθ lenses help to correct this difference, making all the dot-to-dot pitches equal on the drum surface.

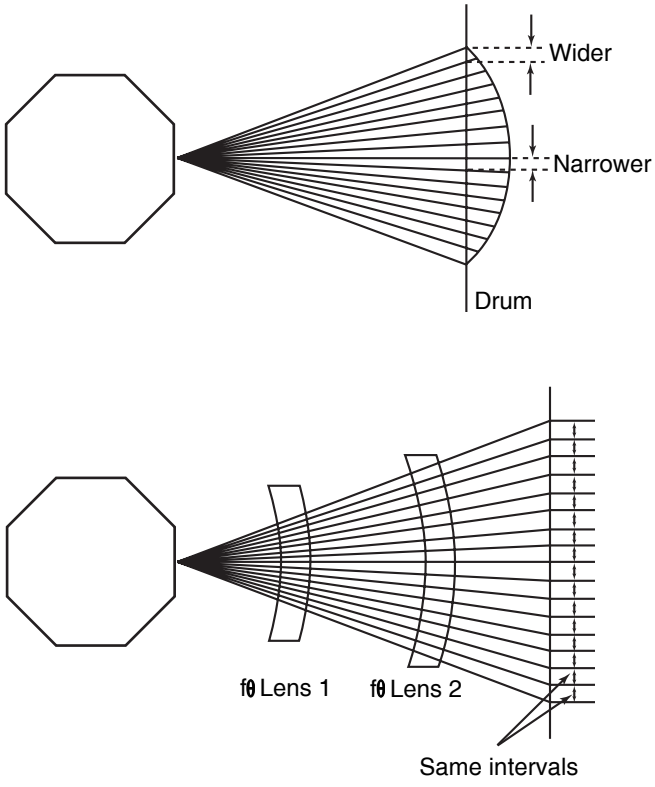


Fig. 8-203

b. Face tilt correction

The reflecting face of the polygonal mirror is tilted slightly to one side against the perfect vertical. Horizontal deviation of the laser light which is caused by the tilt is corrected.

c. Sectional shape of laser beam

The shape of the laser beam spotted on the drum is adjusted.

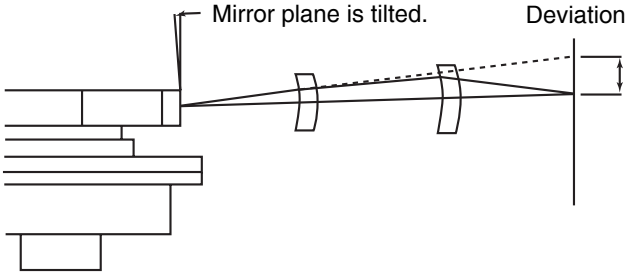


Fig. 8-204

(4) H-Sync signal detection PC board (SNS board)

The laser light which is started to be scanned from one of the reflected plane of the polygonal mirror is reflected by the H-Sync detection mirror and enters the PIN diode on the H-Sync signal detection PC board. The primary scanning synchronizing signal is generated based on this reflection.

(5) Laser driving PC board (LDR board)

This control board has the following functions:

a. APC control function (adjusts disparity of the laser intensity caused by temperature)

b. Laser ON/OFF function

(6) Slit glass

Slit glass is located where the laser beams are output from the laser optical unit, and it protects the unit from dust.

8.3 Laser Diode

The laser used in this equipment is a A1GaAs type semiconductive laser. It is generated in the single-horizontal mode, and its wavelength is approx. 785 nm. This semiconductive laser outputs 10mW with standard DC power supply. Laser intensity is controlled by using the output from the PIN diode for monitoring light output in the semiconductive laser.

The relation between the current and optical output of the semiconductive laser is as shown at right. Light emission is started when the forward current reaches or becomes larger than the threshold current and outputs the monitor current which is proportionate to the optical output. The threshold current and monitor current differs depending on each semiconductive laser. So optical output has to be adjusted to maintain a constant value.

Since the optical output of the semiconductive laser is decreased as the temperature of the laser rises, APC control needs to be performed to maintain a constant optical output.

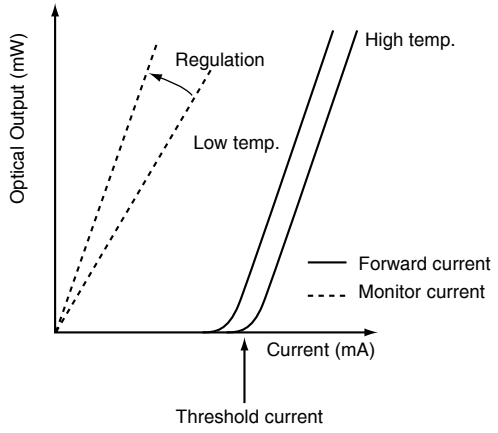


Fig. 8-301

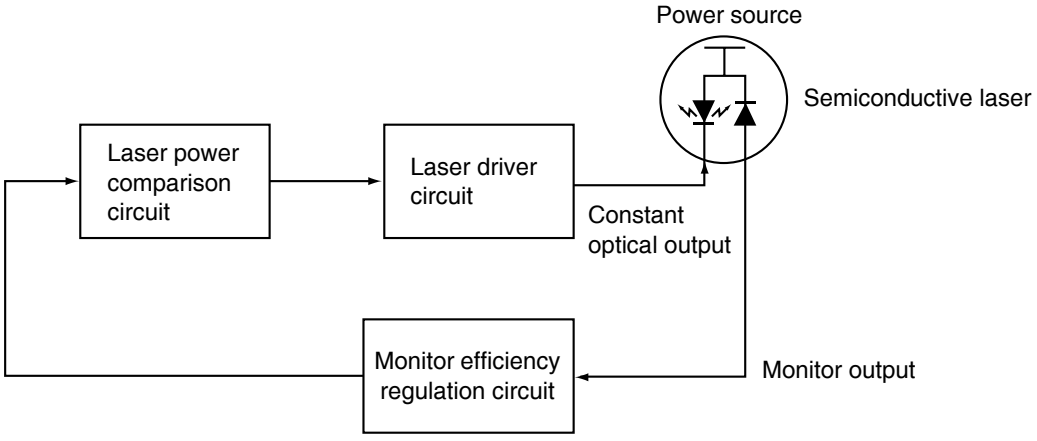


Fig. 8-302

Fig. 8-302 shows a block diagram of the semiconductive laser control circuit. The semiconductive laser performs monitor efficiency regulation (a process to control monitor current for the light amount), and laser itself is adjusted to initial output emission of approx. 3.0 mW (approx. 408 µW on the drum surface). The regulated voltage of the monitor output is feedback to the laser power comparison circuit. This monitor output voltage is compared with the laser power voltage set for the control circuit for every scanning. Laser driver circuit increases the forward current if the laser power is insufficient, and decreases the current when the power is excessive to maintain a constant optical output.

8.4 Laser Unit Cooling Fan

The laser unit cooling fan is a propeller fan (80 x 80 mm). It cools down the polygonal motor and the Laser driving PC board.

8.5 Polygonal Motor

(1) Drive circuit of the polygonal motor

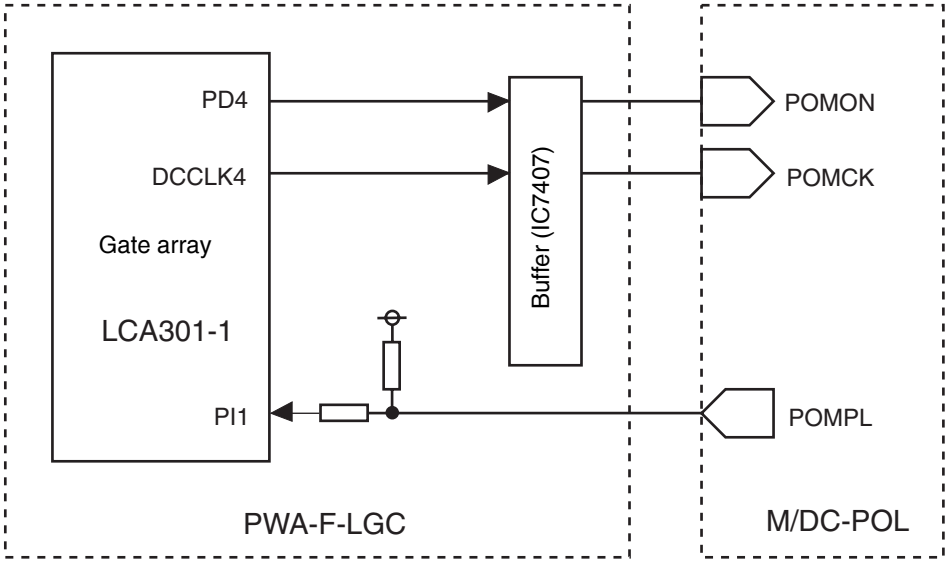


Fig. 8-501

(2) Control signal

The polygonal motor is a DC motor which is PLL-controlled by clock signal. The signals from LGC board controls the polygonal motor.

Signal	Level "L"	Level "H"	Remarks
POMON	ON	OFF	Polygonal motor ON/OFF signal
POMCK	—	—	Polygonal motor reference clock signal
POMPL	Normal rotation	Abnormal rotation	Polygonal motor PLL signal

8.6 Disassembly and Replacement

[A] Laser optical unit

(1) Take off the rear cover (► Chapter 2.5.1 [P]).

(2) Take off the LGC board cover (► Chapter 2.5.2 [A]).

(3) Disconnect 2 connectors and release the harness from the harness clamp.

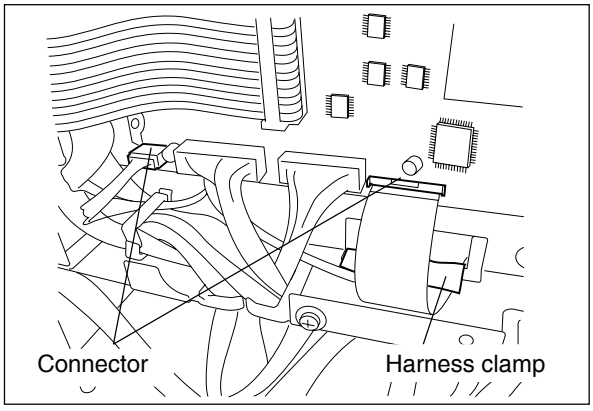


Fig. 8-601

(4) Take off the left cover (► Chapter 2.5.1 [F]).

(5) Remove 2 screw and take off the toner cover.

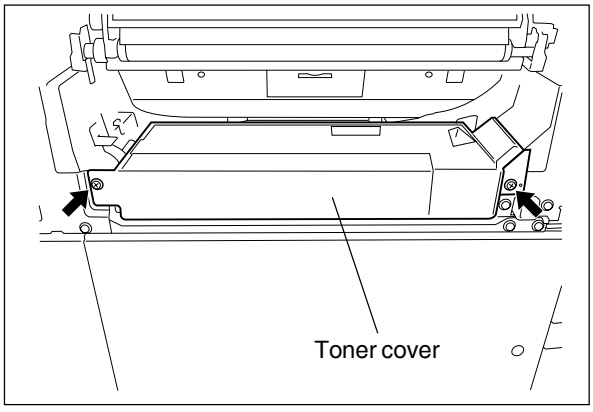


Fig. 8-602

(6) Release the harness, loosen 2 screws and take off the anti-vibration bracket.

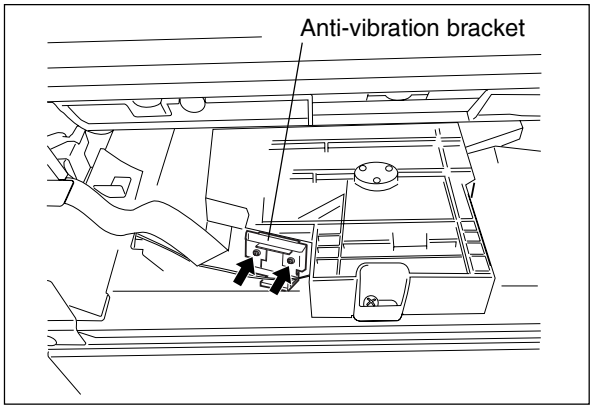


Fig. 8-603

(7) Pull out 2 harnesses and remove 1 screw.

(8) Pull out the laser optical unit while lifting it up and take it off.

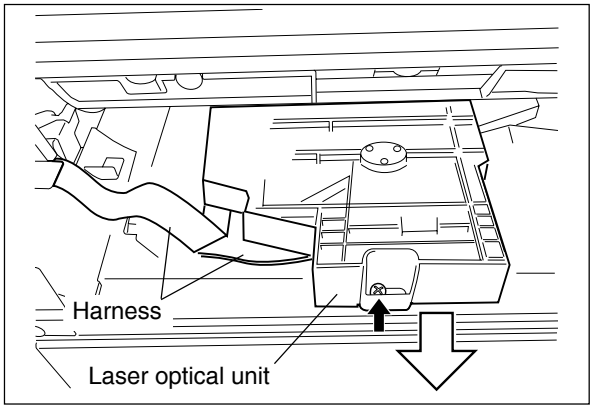


Fig. 8-604

Notes:

1. Do not leave fingerprints or stain on the slit glass.
2. Laser optical unit is a precise apparatus. Handle the unit with extra care not to shock or vibrate it.
3. Do not disassemble the unit in the field since it is very sensitive to the dust and stain.
4. When installing the laser optical unit (installing the harnesses), take off the left rear cover first so that the harnesses will be easily seen and installed (View from (A)) (► Chapter 2.5.1 [G]).

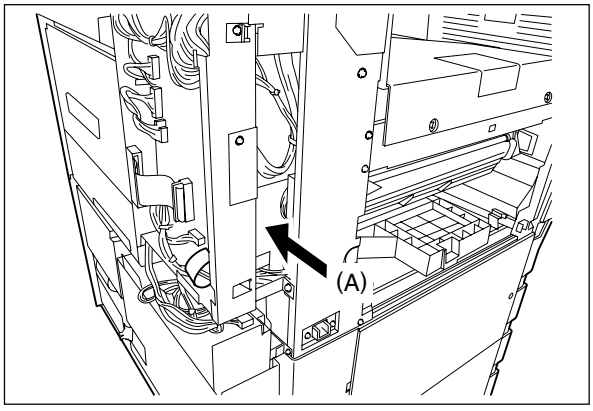


Fig. 8-605

[B] Laser unit cooling fan

(1) Open the front cover.

(2) Remove the receiving tray (► Chapter 2.5.1 [B]).

(3) Remove 2 screws and take off the inner cover.

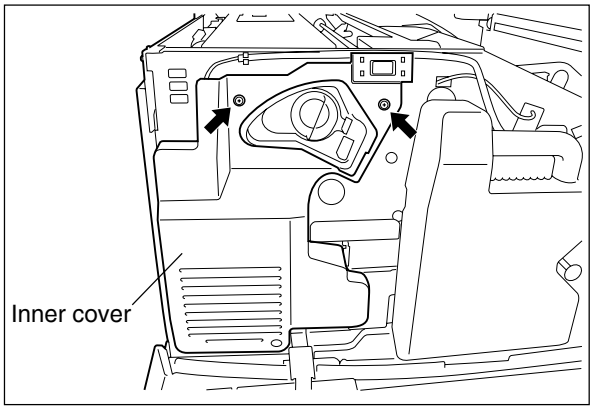


Fig. 8-606

(4) Disconnect 1 connector and remove 2 screws. Take off the laser unit cooling fan.

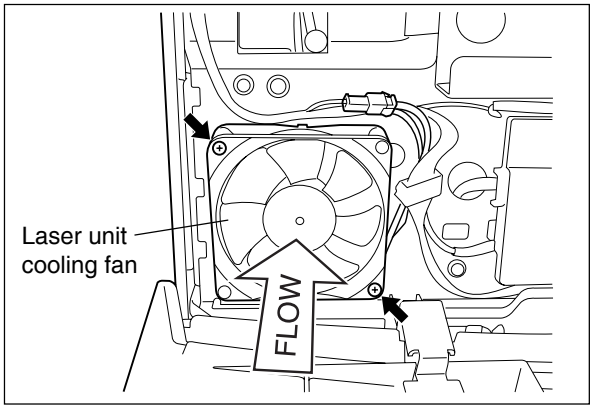


Fig. 8-607

9. DRIVE SYSTEM

9.1 General Description

This chapter explains about each drive system of the main motor, transport motor and developer motor. The function of each drive unit is as follows:

- Main motor
  - Photoconductive drum
  - Transfer belt
- Transport motor
  - Fuser unit — Bridge unit (option)
  - 2nd transfer roller
  - Registration roller
  - Transport roller
  - Feed roller
  - Bypass feed roller
- Revolver motor — Revolver unit
- Developer motor
  - Black developer unit
  - Color developer unit
- ADU motor — ADU
- Exit motor — Exit roller
- Toner motor — Black toner cartridge
- Drum cleaner brush motor — Drum cleaner brush
- Transfer belt cleaner auger motor — Transfer belt cleaner auger

9.2 Main Motor

9.2.1 Construction

The main motor drive unit consists of two parts: One part transmits the drive from the main motor to photoconductive drum and the transfer belt, and another part transmits the drive from the drum cleaner brush motor to the drum cleaner brush.

The drive to the photoconductive drum is transmitted by the gear, timing belt and the coupling and the drive to the transfer belt is transmitted by the gear and timing belt. The main motor is a brushless DC motor.

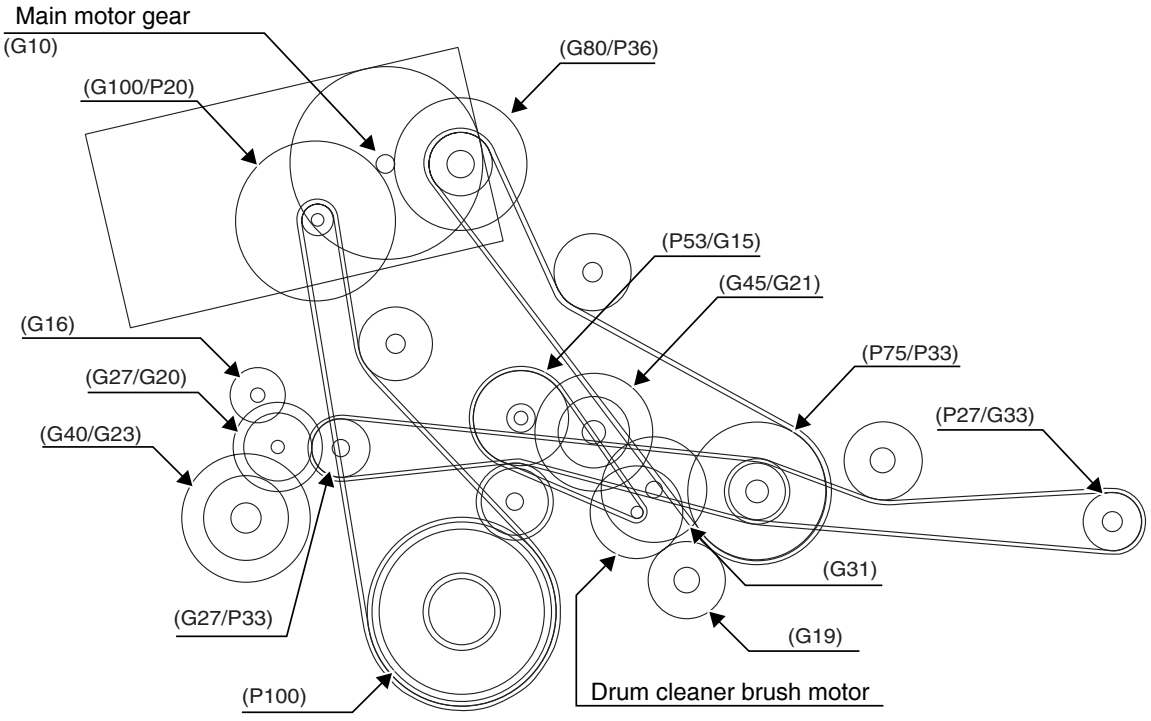


Fig. 9-201

9.2.2 Drive circuit of main motor

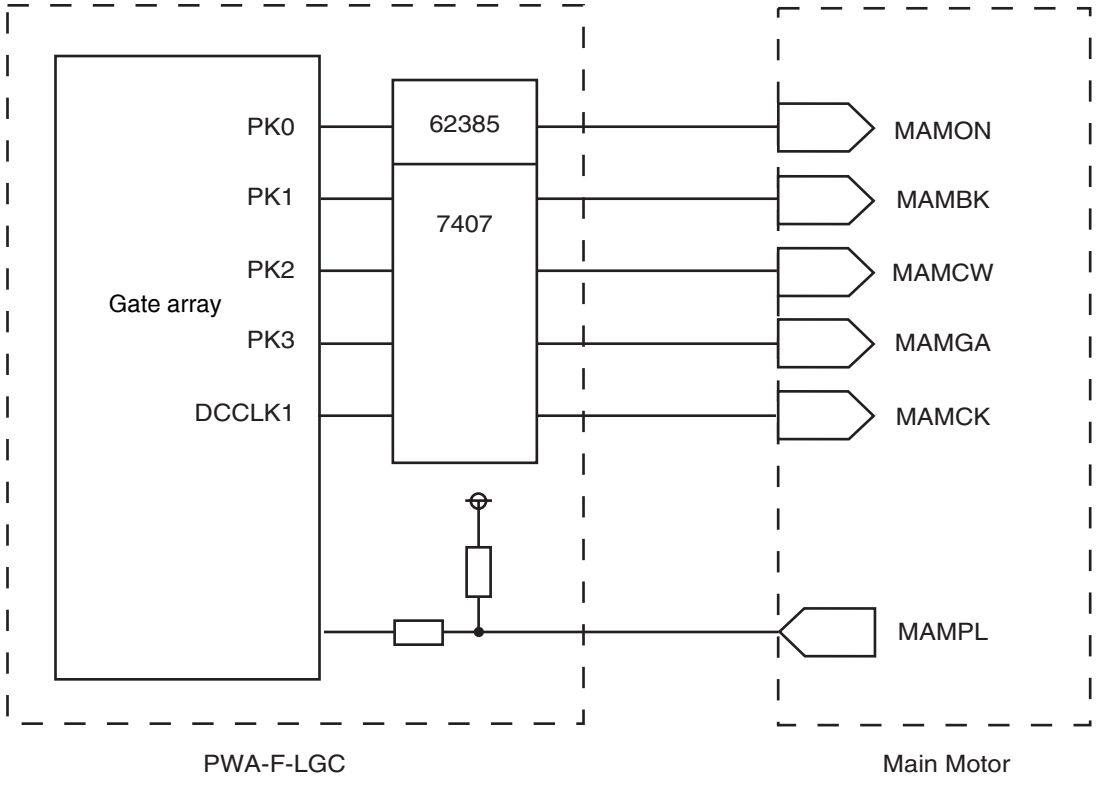


Fig. 9-202

9.2.3 Signal level of motor circuit

Signal	Level "L"	Level "H"	Remarks
MAMON	ON	OFF	Main motor ON signal
MAMBK	Braking	Normal	Main motor brake signal
MAMCW	CW	CCW	Main motor rotational direction signal
MAMGA	Low speed	High speed	Main motor speed switching signal
MAMCK	—	—	Main motor reference clock signal
MAMPL	Normal	Out of control	Main motor PLL signal

* CCW: forward rotation CW: backward rotation

(1) The control signal from LGC controls the operations of the main motor, such as switching of ON/OFF, a rotational direction, a rotational speed, etc. The rotational speed is decided by clock frequency output at the main motor. The speed is lowered to the range from 1/2 to 1/4 at the Thick Paper/OHP Film Mode. This switching is performed between the completion of the 1st transfer and that of the 2nd transfer.

9.3 Transport Motor

9.3.1 Construction

The transport motor drive unit transmits the drive from the transport motor to the fuser unit, 2nd transfer roller, registration roller, transport roller, feed roller, bypass feed roller and bridge unit (option) through the gears and clutches.

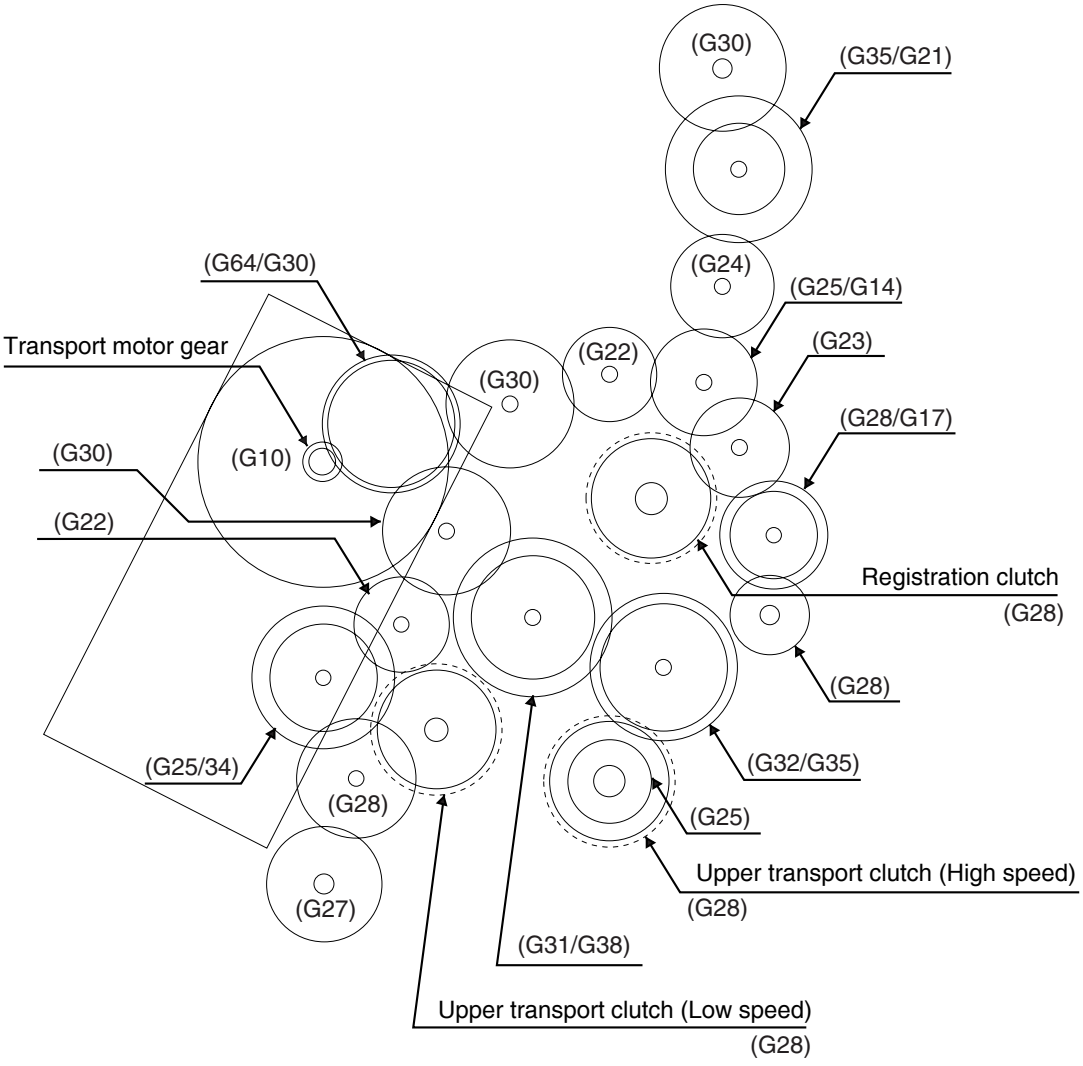


Fig. 9-301

9.3.2 Drive circuit of transport motor

The transport motor is a DC brushless motor. At color printing modes with thick paper or OHP film, the transport speed is lowered to 1/2, 1/3 or 1/4 depending on its mode for most effective fusing.
The following is the block diagram of the transport motor.

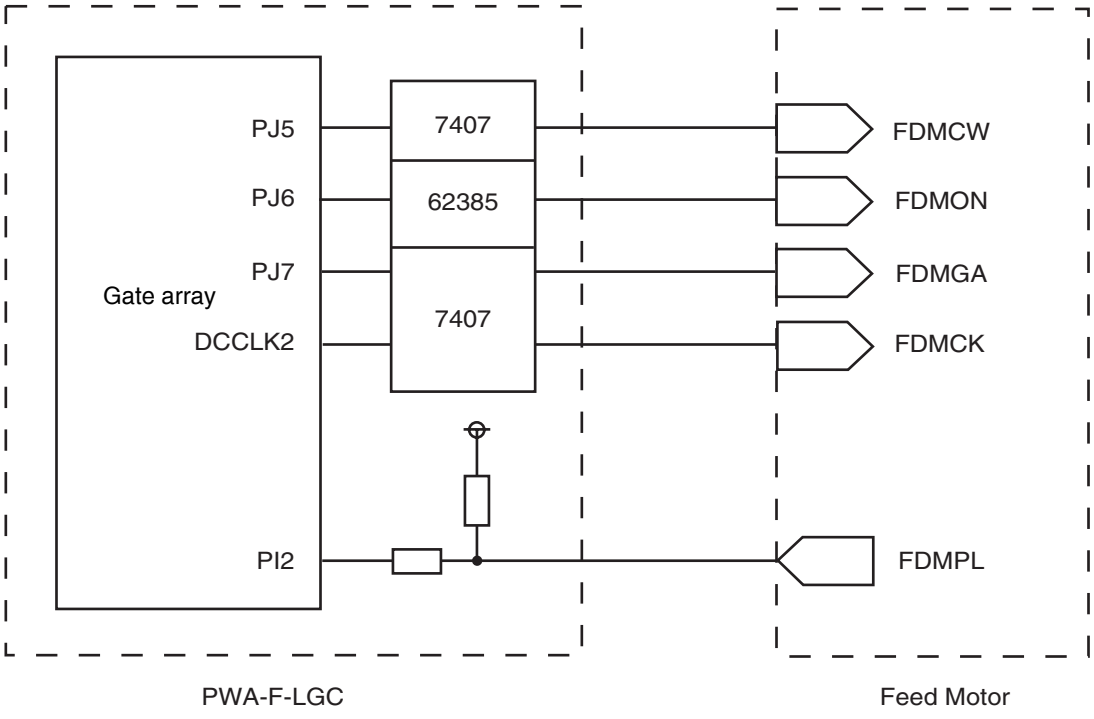


Fig. 9-302

Signal level of motor circuit

Signal	Level "H"	Level "L"	Remarks
FDMCW	CCW	CW	Transport motor rotational direction signal
FDMON	OFF	ON	Transport motor ON signal
FDMGA	High speed	Low speed	Transport motor speed switching signal
FDMCK	—	—	Transport motor reference clock signal
FDMPL	Out of control	Normal	Transport motor PLL signal

* FDMCW (rotational direction signal): The motor does not rotate backward (CCW) in actual movement.

9.4 Developer Motor

9.4.1 Construction

The developer motor is a motor drives the following movements:

(A) Lifting movement by rotating the lifting cam in the black developer unit

(B) Rotational movement of magnet roller in the black developer unit

(C) Rotational movement of toner supply auger in the color developer unit

(D) Rotational movement of magnet roller in the color developer unit

Each movement is performed by drive transmission from the developer motor through the gears and clutches.

The revolver unit contains three color developer units. The developer motor drives the color developer unit only at the developing position; it means each developer unit does not have its own drive. When the revolver rotates, the clutch turns OFF so that the drive of the developer motor will not be transmitted and a damage to the gear will be prevented.

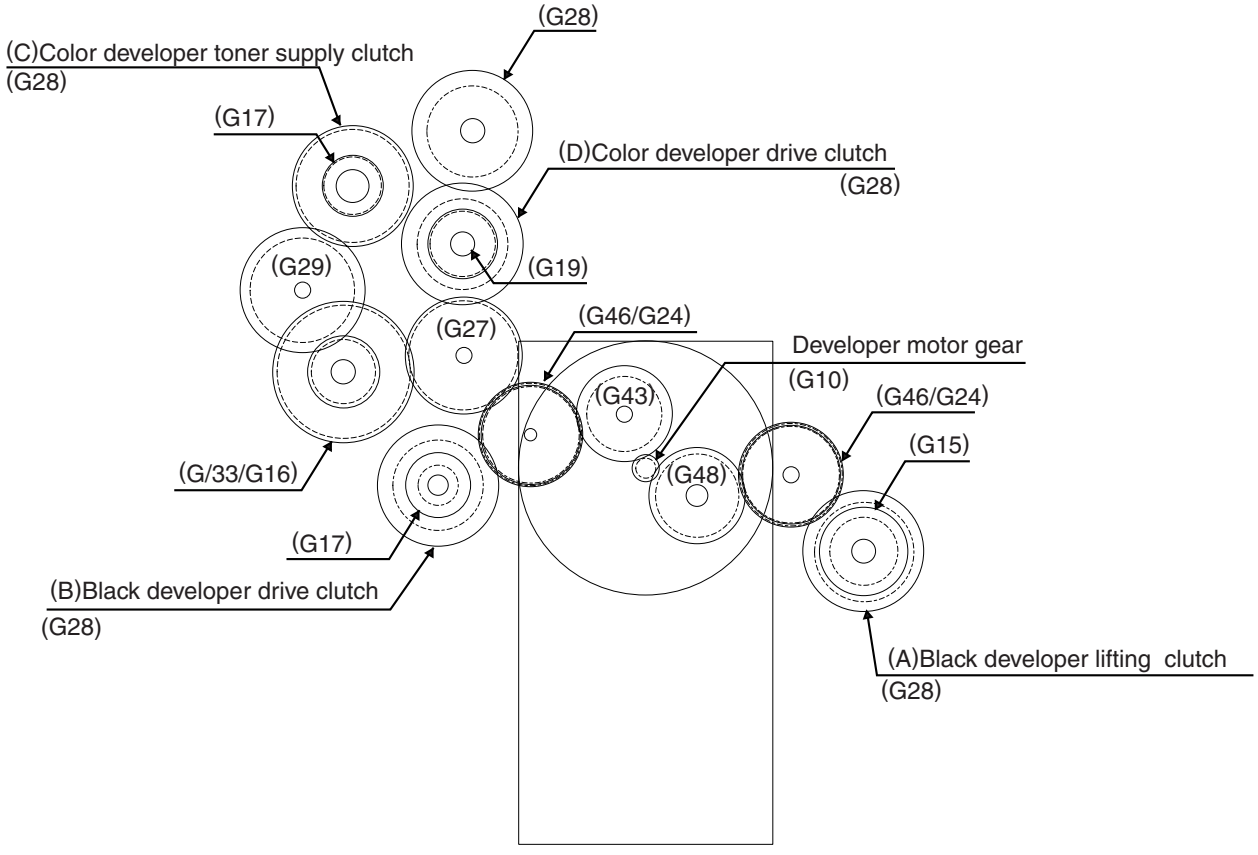


Fig. 9-401

9.4.2 Drive circuit of developer motor

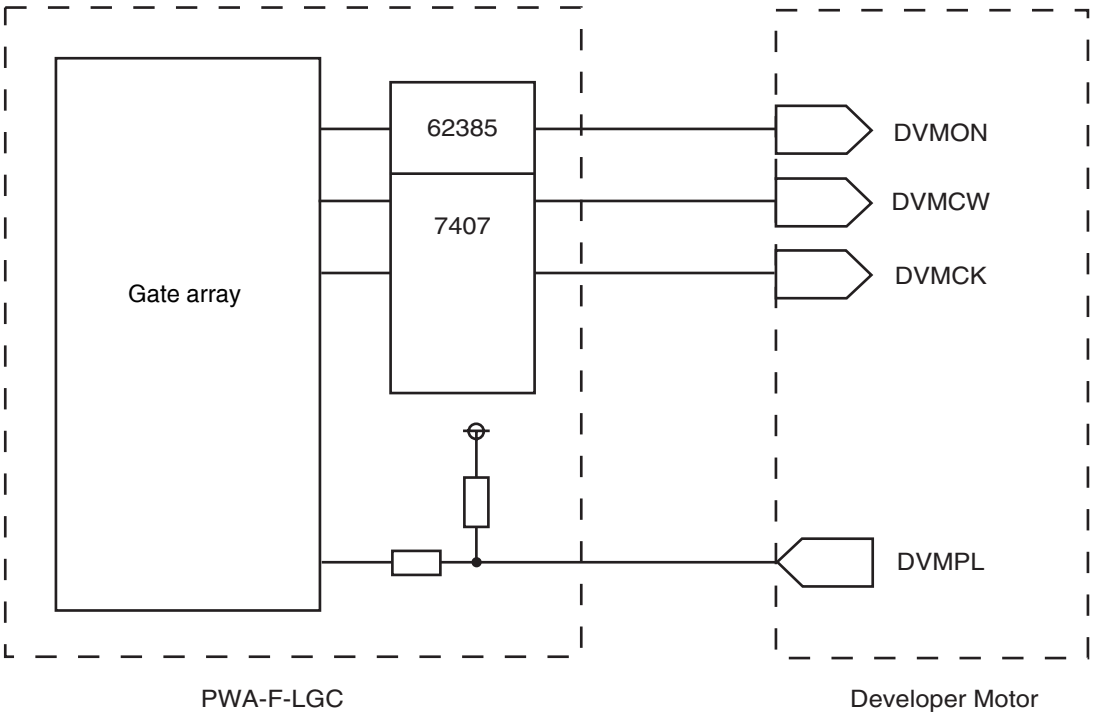


Fig. 9-402

(1) LGC board provides a signal to control the rotation of the developer motor.
(DVMON: Developer motor ON signal)
When signal from LGC board is the level "L", the developer motor stops.

(2) DVMCW signal controls the rotational direction of the motor. The motor rotates forward (CCW) but does not rotate backward (CW) in actual movement. Namely, DVMCW signal is always output level "H".

Signal level of motor circuit

Signal	Level “L”	Level “H”	Remarks
DVMON	ON	OFF	Developer motor ON signal
DVMCW	CW	CCW	Developer motor rotational direction signal
DVMCK	—	—	Developer motor reference clock signal
DVMPL	Normal	Out of control	Developer motor PLL signal

9.5 Disassembly and Replacement

[A] Developer motor drive unit

(1) Take off the rear cover (► Chapter 2.5.1 [P]).

(2) Take off the LGC board, SYS board and switching power supply with the whole case (► Chapter 2.5.2 [A] [C] [E]).

(3) Remove 3 screws and take off the flywheel.

Note: The main motor can be taken off by itself without removing the drive unit. (2 screws and 1 connector)

(4) Remove 2 screws and take off the bracket.

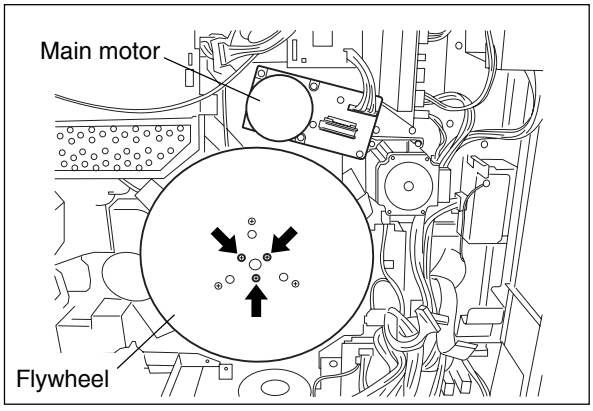


Fig. 9-501

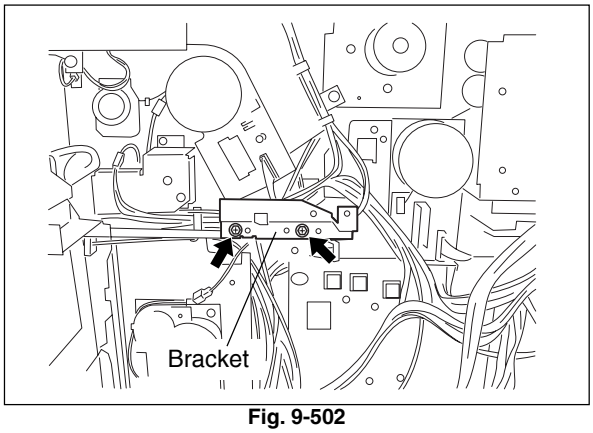


Fig. 9-502

(5) Remove 3 screws and take off the bracket.

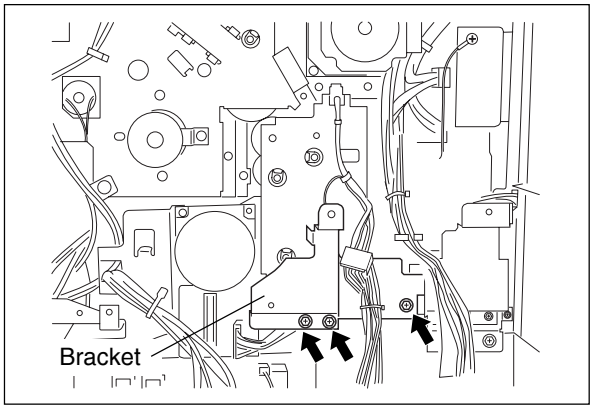


Fig. 9-503

(6) Disconnect 3 connectors and remove 5 screws. Release the harnesses from 3 harness clamps. Take off the developer motor drive unit.

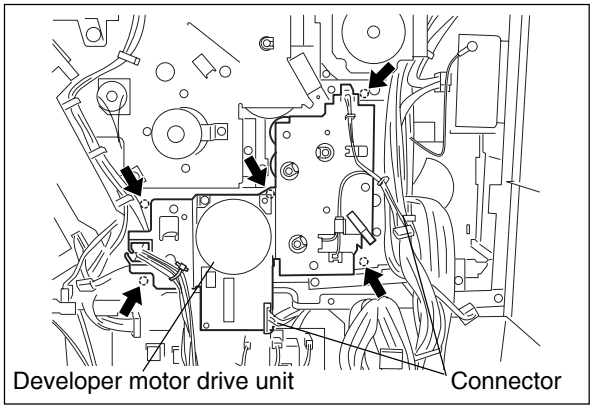


Fig. 9-504

(A-1) Developer motor

(1) Remove 2 screws and take off the developer motor.

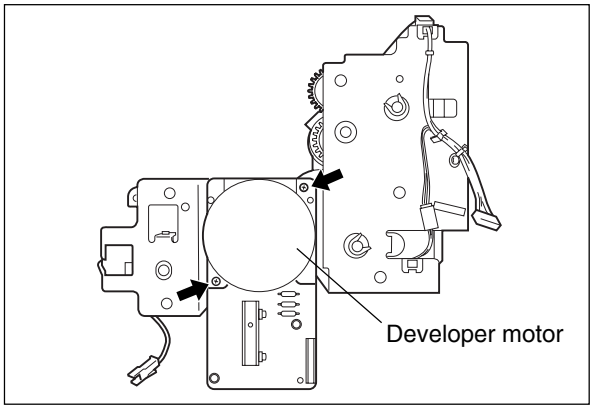


Fig. 9-505

(A-2) Black developer lifting clutch

(1) Remove 4 screws and take off the bracket.

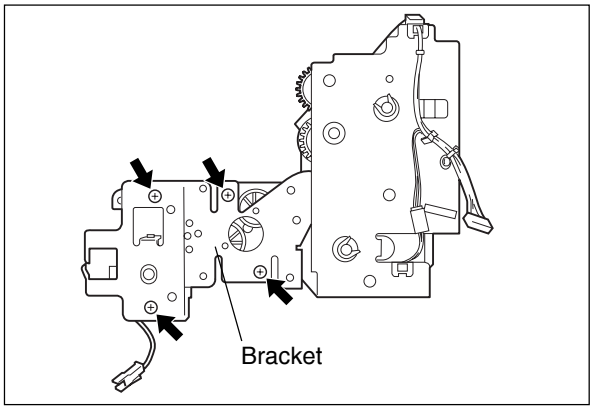


Fig. 9-506

(2) Take off the black developer lifting clutch.

Note: Place the stopper when installing the clutch.

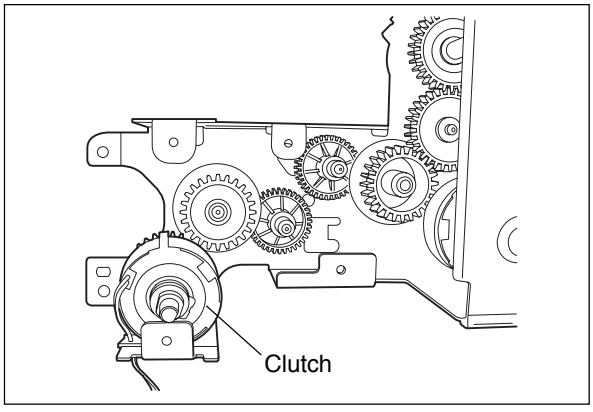


Fig. 9-507

(A-3) Color developer toner supply clutch, color developer drive clutch and black developer drive clutch

(1) Remove 3 screws, 2 clips, 2 bushing, release the harness from 3 harness clamps and take off the bracket.

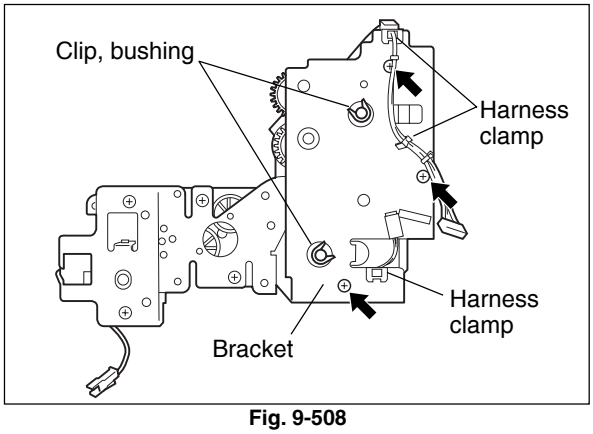


Fig. 9-508

(2) Remove the gear, E-ring and the clip of each clutch.

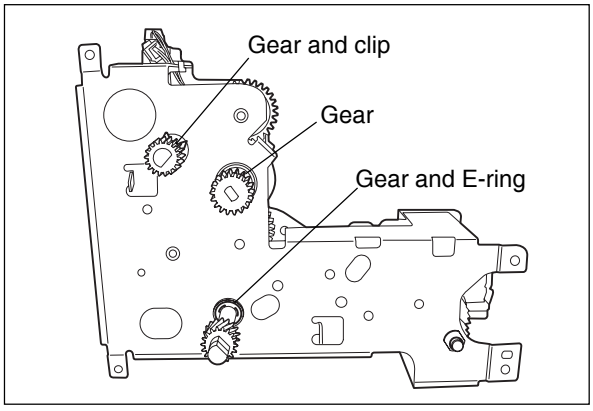


Fig. 9-509

(3) Disconnect 1 connector and take off the color developer toner supply clutch.
(4) Remove clip A and gear C. Remove 1 bushing and clip B. Disconnect 1 connector and take off the color developer drive clutch.
(5) Disconnect 1 connector and take off the black developer drive clutch.

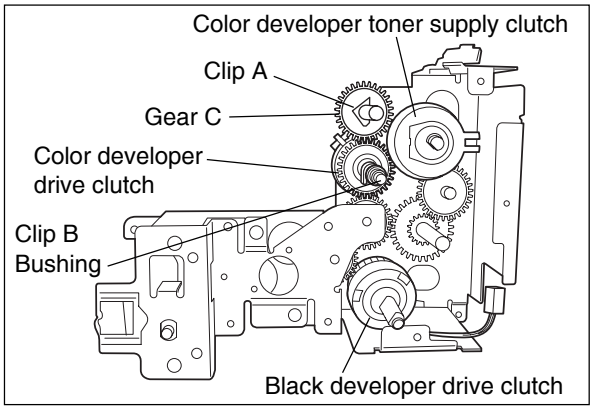


Fig. 9-510

[B] Transport motor drive unit

(1) Take off the rear cover and right rear cover (► Chapter 2.5.1 [P] [L]).
(2) Take off the LGC board and the SYS board with the whole case (► Chapter 2.5.2 [A] [C]).
(3) Remove 3 screws and take off the flywheel (► Chapter 9.5 [A]).
(4) Take off IH control PC board with the whole cover (► Chapter 16.7 [M]).
(5) Take off the ozone exhaust fan with the whole cover (► Chapter 11.7 [J]).
(6) Remove 2 screws and take off the ozone exhaust duct.
(7) Remove 2 screws and take off the bracket.

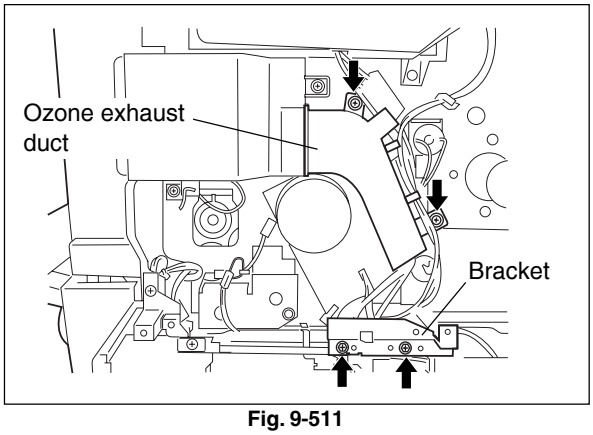


Fig. 9-511

(8) Remove 2 screws and take off the bracket.

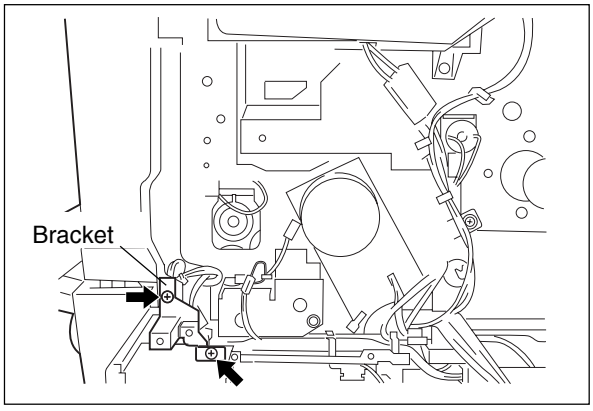


Fig. 9-512

(9) Take off the fuser unit (►Chapter 16.7 [A]).

(10) Remove 1 screw and take off the bracket.

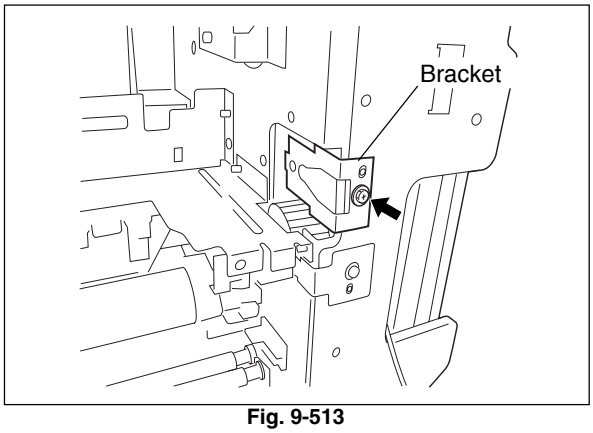


Fig. 9-513

(11) Loosen 1 setscrew, disconnect 1 connector and take off the registration clutch.

(12) Remove 2 screws and take off the clutch fixing cover.

Notes: 1. Make sure not to take off the fixing cover completely. Stand the fixing cover against the equipment being connected with the harness.

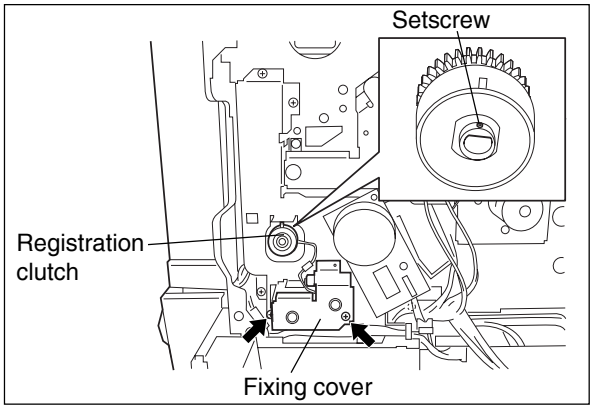


Fig. 9-514

2. When the registration clutch is reassembled, assemble by keeping the end of the shaft match with the end of the clutch.

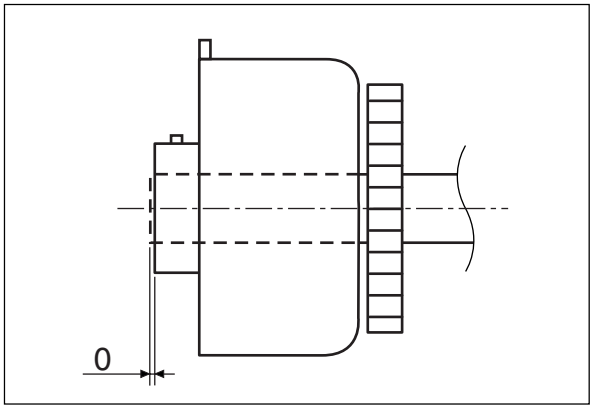


Fig. 9-515

(13) Loosen 1 setscrew, disconnect 1 connector and take off the upper transport clutch (high speed) with the gear.

Note: Do not mix up the registration clutch and upper transport clutch (high speed) when installing.

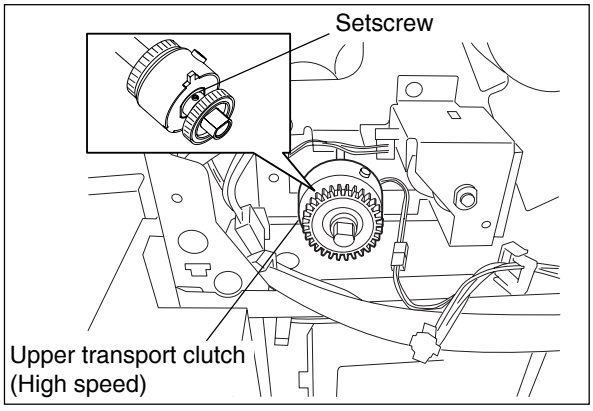


Fig. 9-516

(14) Disconnect 2 connectors and remove 5 screws. Take off the transport motor drive unit.

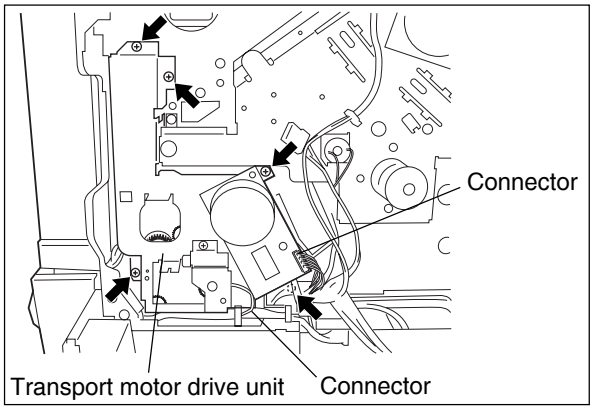


Fig. 9-517

(15) Remove 2 screws and take off the transport motor.

(16) Remove 2 screws and take off the bracket, and then take off the upper transport clutch (low speed).

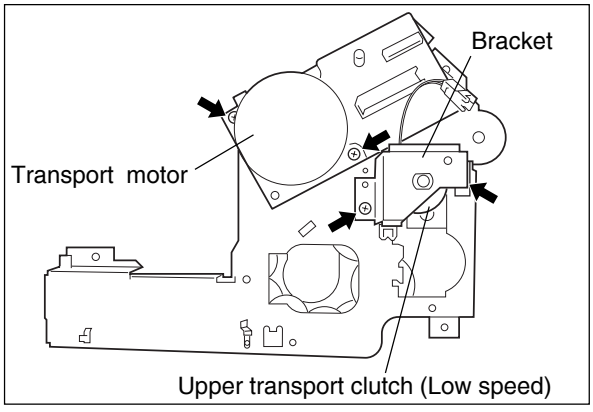


Fig. 9-518

(17) Remove 9 screws and take off the cover of transport gear drive unit.

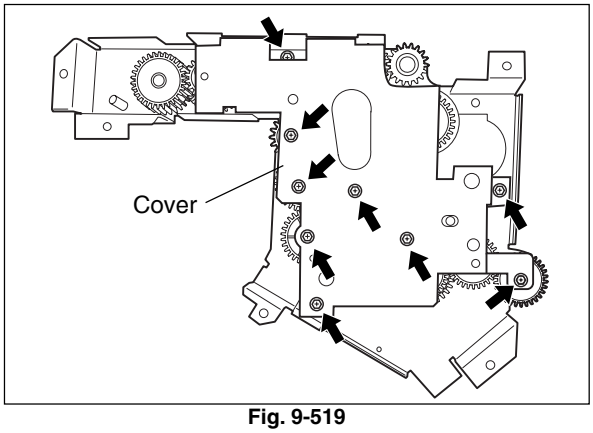


Fig. 9-519

[C] Main motor drive unit

(1) Take off the cleaner unit (► Chapter 11.7 [A]).

(2) Take off the rear cover (► Chapter 2.5.1 [P]).

(3) Take off the LGC board and the SYS board with the whole case (► Chapter 2.5.2 [A] [C]).

(4) Remove 3 screws and take off the flywheel (► Chapter 9.5 [A]).

(5) Take off IH control PC board with the whole cover (► Chapter 16.7 [M]).

(6) Take off the ozone exhaust fan with the whole cover (► Chapter 11.7 [J]).

(7) Remove 2 screws take off the ozone exhaust duct (► Chapter 9.5 [B]).

(8) Remove 4 screws and take off the bracket.

Note: This step can be omitted if the developer motor drive unit and the transport motor drive unit are already taken out.

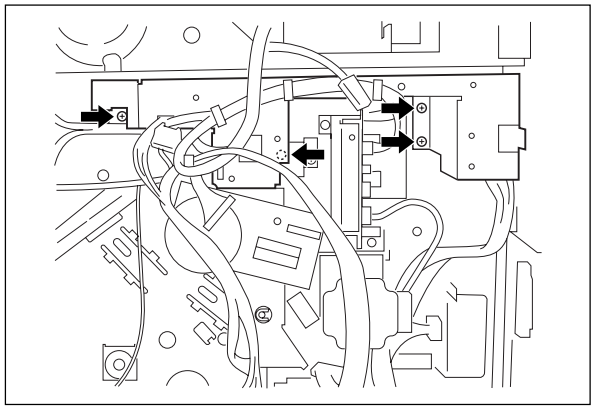


Fig. 9-520

(9) Disconnect 2 connectors, release 2 harness clamps and remove 6 screws.
Take off the main motor drive unit.

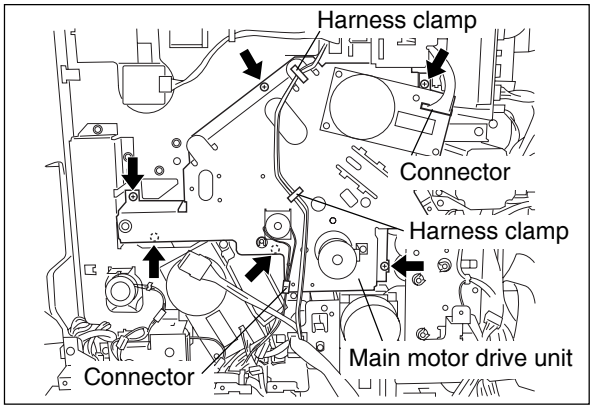


Fig. 9-521

(10) Remove 4 screws and take off the main motor.

Note: When taking off only the main motor, it can be taken off by removing the LGC board and SYS board with the whole case.

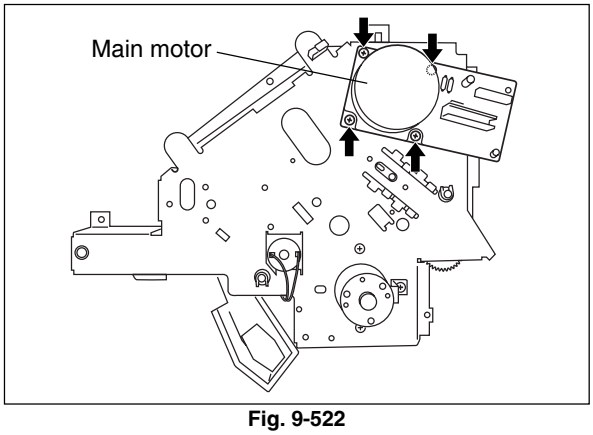


Fig. 9-522

(11) Loosen 1 screw, shift the tension plate to the direction of the white arrow, and then fix it at the position where the belt tension is loosened.

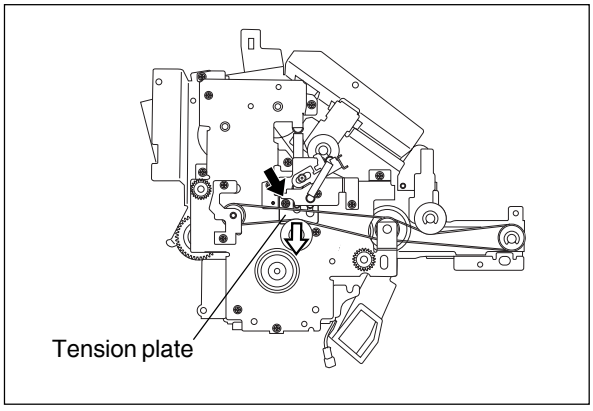


Fig. 9-523

(12) Remove clip A (back side of the unit), gear A with the shaft and 2 bushings. Remove clip B (back side of the unit), gear B with the shaft, 2 bushings, and gear C between the metal plates of the drive unit.

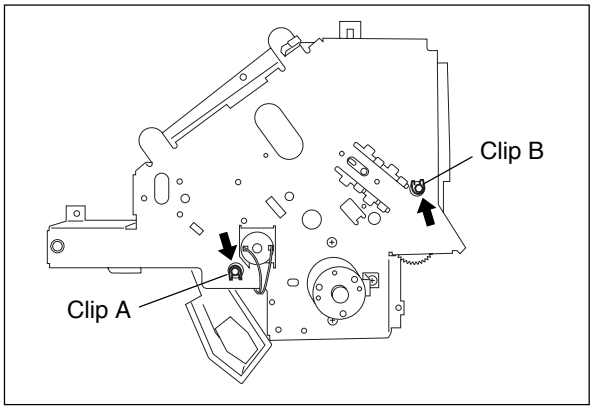


Fig. 9-524

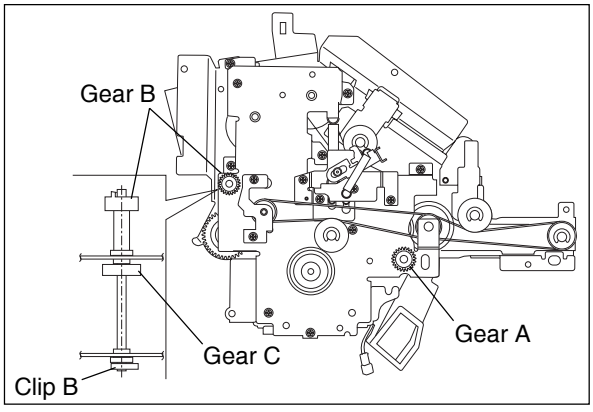


Fig. 9-525

(13) Remove 8 screws (denoted with the white arrows are the plastic screws) and take off the plate cover.

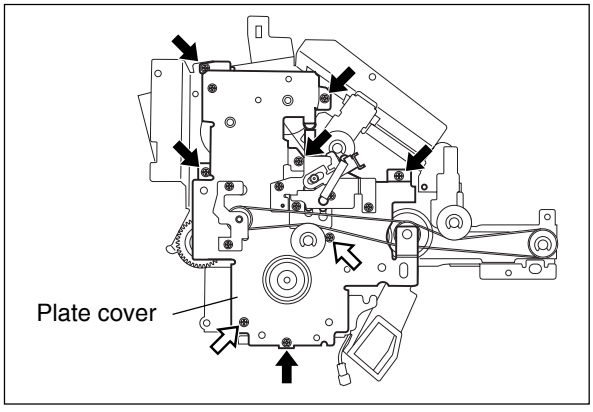


Fig. 9-526

(14) Remove 2 screws and take off the drum cleaner brush motor.

Notes: 1. When reassembling the unit, make sure to follow the inverse procedure of disassembling.

2. Make sure to assemble the unit while all the belt tensions are loosened. Tense the belts after reassembling.

3. Rotate the rotor section of the motor for several times by hand to shake down the belt while the belt is tense. Then screw the belt tensioner.

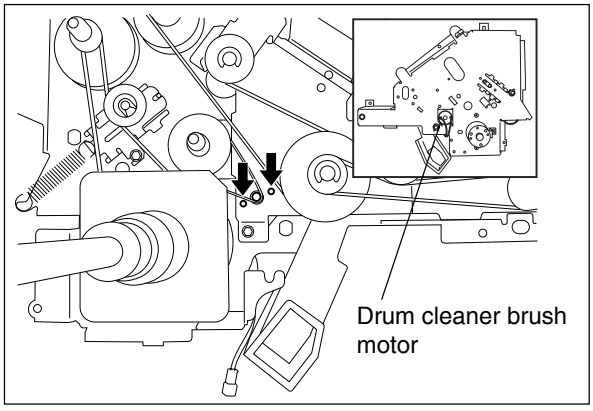


Fig. 9-527

10. PAPER FEEDING SYSTEM

10.1 General Descriptions

This chapter explains how the system works to pick up paper from the drawer or bypass tray and transport it to the transfer unit.

The paper feeding system mainly consists of the pickup roller, feed roller, separation roller, transport roller, registration roller, bypass paper sensor, empty sensor, paper stock sensor, feed sensor, registration sensor and drive system for these components. The transport motor drives the above rollers and sensors. Refer to chapter 9 for more details about the transport motor and its drive system.

(1) Pickup roller (Drawers and bypass feed)

This roller moves up and down and draws out the paper from the bypass tray or drawer and transport it to the feed roller.

(2) Feed roller (Drawers and bypass feed)

This roller is placed against the separation roller. It transports the paper from the pickup roller to the transport roller.

(3) Separation roller (Drawers and bypass feed)

This roller is placed against the feed roller. When two sheets of paper or more are transported from the pickup roller, the load of the torque limiter of the separation roller is heavier than the frictional force between the sheets. As the result, the separation roller is stopped and the lower paper is not advanced any further. When only one sheet is transported from the pickup roller, the separation roller rotates following the feed roller.

(4) Transport roller (Drawers and bypass feed)

This roller transports the paper sent from the feed roller to the registration roller.

(5) Registration roller

Paper transported from the transport roller is pushed against the registration roller which aligns the leading edge of the paper.

Then, the registration rollers rotate to transport the paper to the transfer unit.

The followings are about sensors which detect paper size, availability of paper and position of the paper being transported to control ON/OFF of the rollers.

(6) Bypass paper sensor

This sensor detects if paper is set in the bypass tray. If it is, bypass feeding always comes before drawer feeding.

(7) Empty sensor (Upper/Lower drawer)

This is a transmissive-type sensor and detects the availability of paper in the drawer by using an actuator. When there is no paper in the drawer, the actuator blocks the light path of the sensor, and the sensor determines that there is no paper.

(8) Paper stock sensor (Upper/Lower drawer)

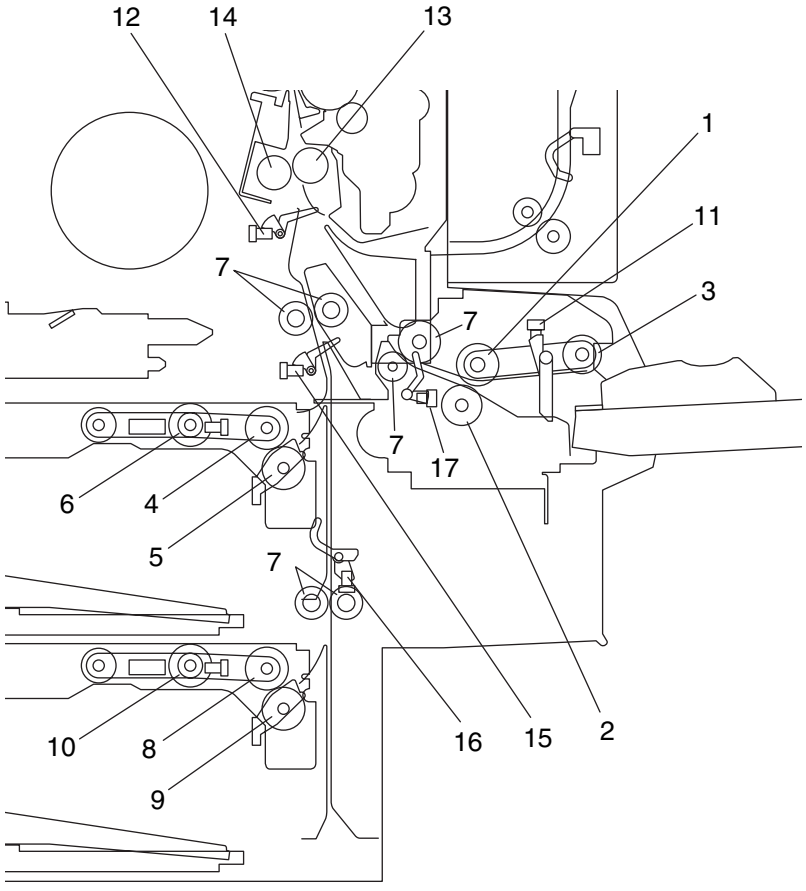
This is a transmissive-type sensor which detects the amount of the remaining paper in the drawer using an actuator. When the remaining paper is consumed and becomes around 100 sheets, the actuator blocks the light path for the transmissive-type sensor to notify that the paper is getting fewer.

(9) Feed sensor (Upper/Lower drawer and bypass feed)

This sensor detects if the leading edge or trailing edge of the paper has passed the feed roller. It also detects jamming such as misfeeding.

(10) Registration sensor

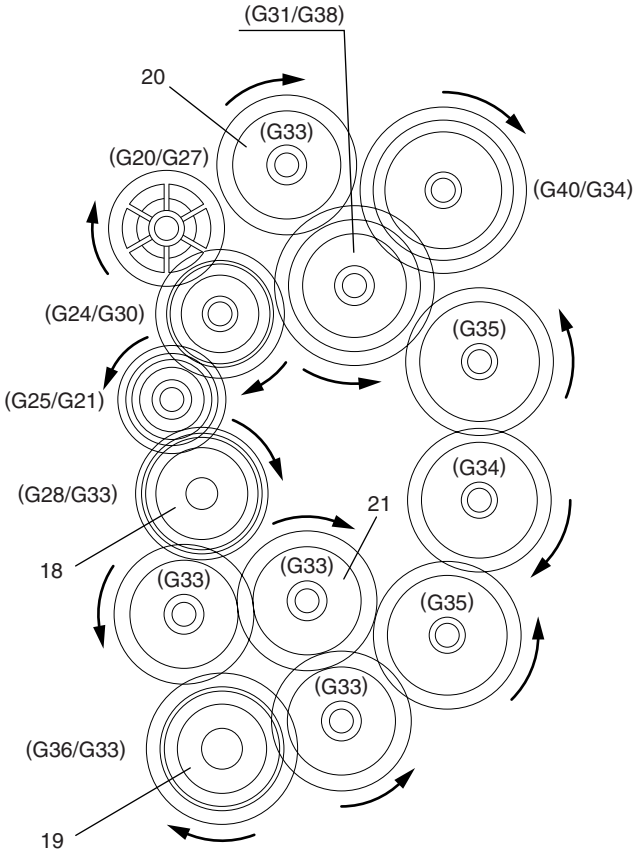
This sensor detects that the leading edge of the paper has reached the registration roller and the trailing edge of the paper has passed the registration roller.



Paper Feeding Section Sectional View (Front side)

Fig. 10-101

No.	Name	No.	Name
1	Bypass feed roller	10	Lower drawer pickup roller
2	Bypass separation roller	11	Bypass paper sensor
3	Bypass pickup roller	12	Registration sensor
4	Upper drawer feed roller	13	Registration roller (rubber roller)
5	Upper drawer separation roller	14	Registration roller (metal roller)
6	Upper drawer pickup roller	15	Upper drawer feed sensor
7	Transport roller	16	Lower drawer feed sensor
8	Lower drawer feed roller	17	Bypass feed sensor
9	Lower drawer separation roller		



Paper Feeding Section Drive System (Rear side)

Fig. 10-102

No.	Name
18	Lower transport clutch (Low speed)
19	Lower transport feed clutch (High speed)
20	Upper drawer feed clutch
21	Lower drawer feed clutch

10.2 Description of Operation

10.2.1 Operation of bypass pickup roller

When the bypass pickup solenoid is turned ON, the plunger is pulled, and then the lever is rotated. The pickup arm is then brought down with its own weight. When the bypass pickup solenoid is turned OFF, the pickup arm is brought up by the spring force.

The driving force transmitted through the bypass feed clutch is transmitted to the bypass feed roller through the shaft and then to the bypass pickup roller through the timing belt. The roller is rotated by this driving force.

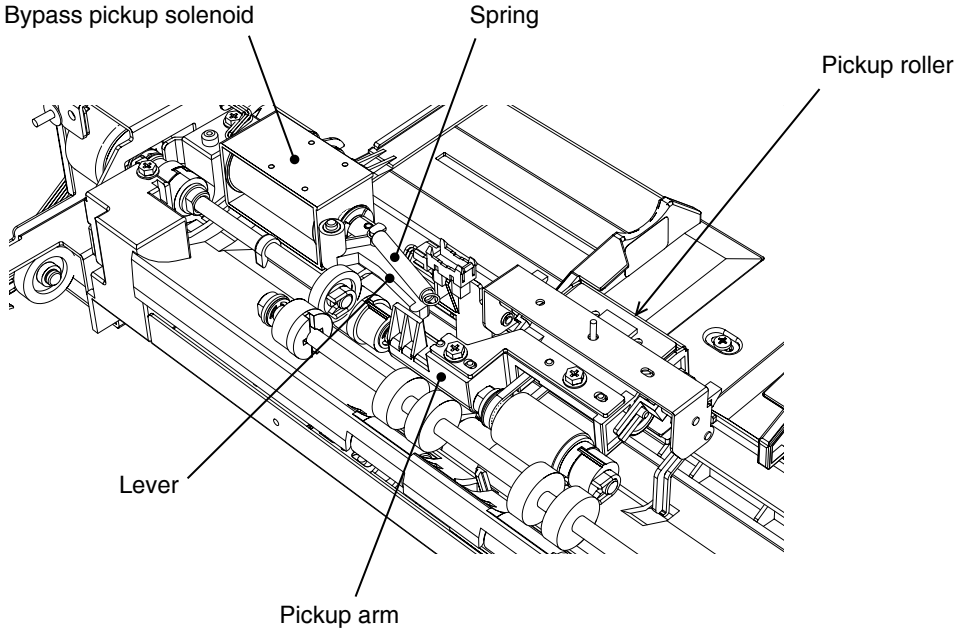


Fig. 10-201

10.2.2 Operation of drawer pickup roller

When the drawer is inserted, the protrusion at the rear side of the drawer moves up the lever (a) to the direction of A. The pickup roller and roller holder are then lowered by it's own weight.

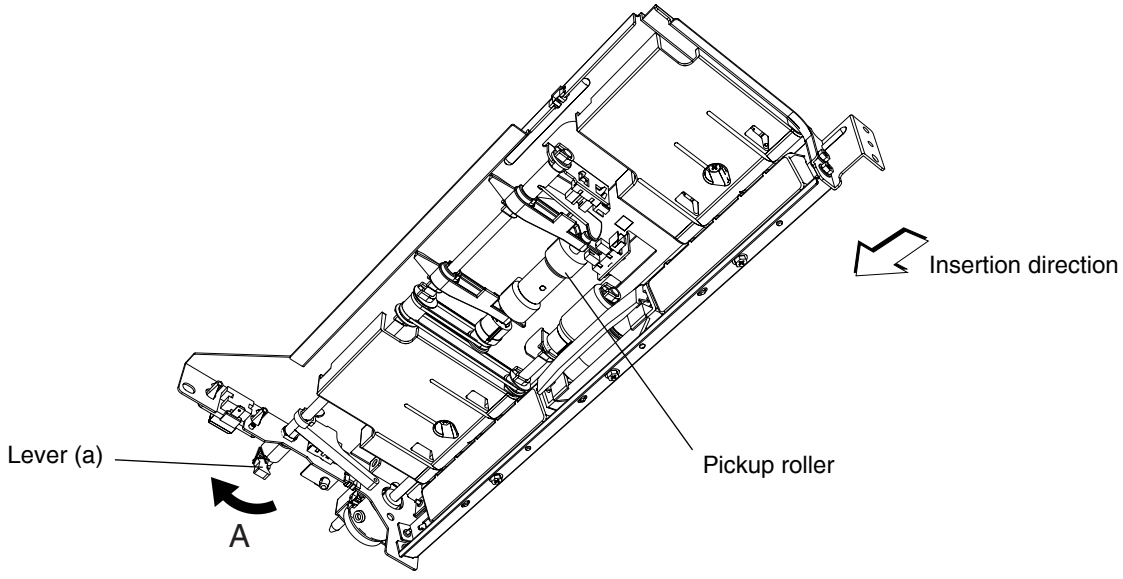


Fig. 10-202

10.2.3 Separation of paper

The separation roller in this equipment works to separate the sheets being fed. The separation roller unit consists of the feed roller, separation roller, spring joint, etc., as shown below.

The feed roller is rotated by the feed clutch in the direction of the arrow (↷) at the same timing as the pickup roller rotation.

The figure at the bottom of this page shows how duplicate feeding is prevented: Since the friction between two sheets is small, the lower sheet is not transported any further while the upper sheet is transported by the feed roller in the direction of the arrow (⬅).

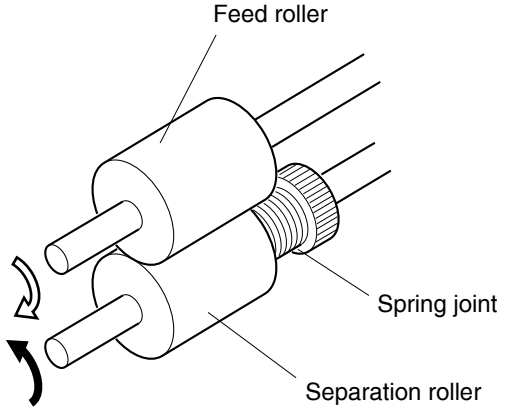


Fig. 10-203

[Example]

When only one sheet enters between the rollers: Since the transporting force of the feed roller is greater than the braking force of the separation roller, the separation roller follows the feed roller, making the sheet go forward to the registration roller.

When two sheets enter between the rollers at the same time:

Since the transporting force of the feed roller and the breaking force of the separation roller are greater than the frictional force between two sheets, the paper A is transported to the direction of the arrow (⬅) and the paper B is braked by the separation roller and is not transported any further.

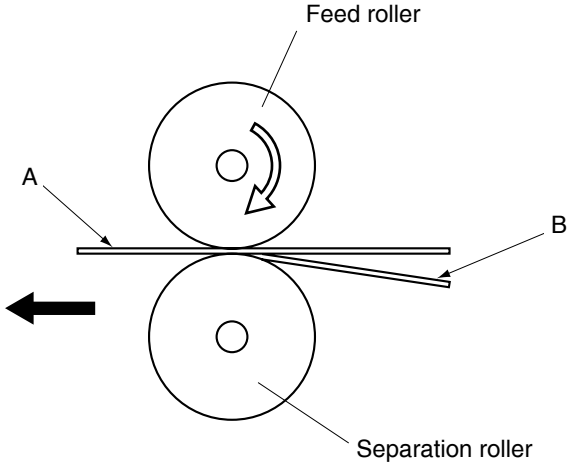


Fig. 10-204

10.2.4 General operation

[A] From power-ON to ready status

(1) When the equipment is turned ON, the tray-up motor is activated and the upper drawer tray starts to rise. When the tray-up sensor is turned ON (L → H), the tray-up motor is turned OFF, and the tray is stopped. At this time, if the empty sensor is OFF (L), it is judged that there is no paper in the drawer. If the empty sensor is ON (H), there is paper in the drawer. The tray stops at raised position regardless of availability of paper. The tray-up motor then starts to rotate in reverse and the lower drawer is raised. The lower drawer is stopped in the same manner as the upper drawer, and the empty sensor detects if there is any paper in the drawer.

(2) If the drawer is not completely inserted when the equipment is turned ON, the tray for that drawer is not raised. When the drawer is inserted completely, the tray is raised and checks the availability of the paper.

(3) If either of the feed sensors is ON (means there is paper on the transport path) when the equipment is turned ON, it is determined that a paper jam has occurred and no operation is enabled until the paper is removed.

[B] Ready status

(1) After the tray is moved up and availability of paper is checked as described above, the equipment enters the ready status. At ready status, the tray remains at raised position.

(2) When a drawer is inserted or removed at ready status, the tray is raised again to check the availability of paper.

[C] Bypass feeding

- The bypass paper sensor detects availability of paper.
- The bypass pickup solenoid is turned ON and the bypass pickup roller is lowered.
- The bypass feed clutch is turned ON and then the bypass pickup roller, bypass feed roller and bypass transport roller are rotated and start feeding.
- The leading edge of paper turns ON the bypass feed sensor and bypass pickup solenoid is turned OFF. Then the bypass pickup roller is raised.
- The leading edge of paper turns ON the registration sensor and the paper is aligned by the registration roller.
- The bypass feed clutch is turned OFF, and then the bypass pickup roller, bypass feed roller and bypass transport roller are stopped.
- The registration clutch is turned ON and the paper is transported to the transfer unit.

[D] Drawer feeding

(D-1) Lower drawer

- The feed clutch and the transport clutch (high speed) are turned ON, and the pickup roller, feed roller and transport roller are rotated to start feeding paper.
- Passing of the leading edge of the paper turns ON the lower drawer feed sensor, then the transport clutch (high speed) is turned OFF then back ON.
- Passing of the leading edge of the paper turns ON the registration sensor and the paper is aligned by the registration roller.
- The transport clutch (high speed) is turned OFF and the transport roller is stopped.
- The registration clutch and transport clutch (low speed) are turned ON and the paper is transported to the transfer unit.

(D-2) Upper drawer

- The feed clutch and the transport clutch (high speed) are turned ON, and the pickup roller, feed roller and transport roller are rotated to start feeding paper.
- Passing of the leading edge of the paper turns ON the upper drawer feed sensor, then the feed clutch and the transport clutch (high speed) are turned OFF then back ON.
- Passing of the leading edge of the paper turns ON the registration sensor and the paper is aligned by the registration roller.
- The feed clutch and the transport clutch (high speed) is turned OFF and the transport roller is stopped.
- The registration clutch and transport clutch (low speed) are turned ON and the paper is transported to the transfer unit.

10.3 Drive Circuit of Tray-up Motor

Tray-up motor (TRY-MTR) : Driven by IC6 (upper/lower drawer) (LGC: TA8428)

Block diagram of TA8428

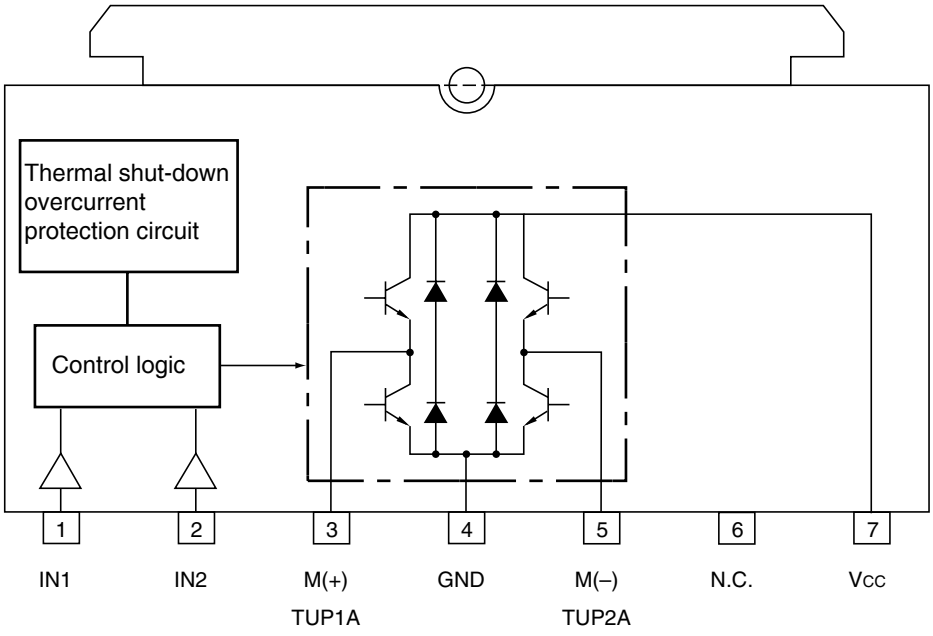


Fig. 10-301

IN1 and IN2 are input terminals to receive the signals from the microcomputer. The control logic, based on the signals from the microcomputer, controls ON/OFF of the motor rotation direction.

Input		Output		Remarks
IN1	IN2	M (+)	M (–)	
H	H	L	L	BRAKE
L	H	L	H	CCW
H	L	H	L	CW
L	L	OFF (high impedance)		STOP

10.4 Disassembly and Replacement

[A] Bypass unit

(A-1) Bypass unit

(1) Take off the right front/rear hinge covers (► Chapter 2.5.1 [N] [O]).

(2) Disconnect 1 connector, remove 1 screw of ground wire and release the harnesses from the harness clamps (2 pcs.).

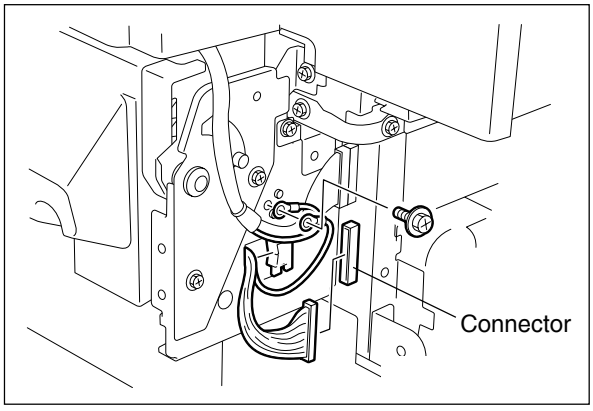


Fig. 10-401

(3) Open the bypass feed tray. Remove 1 screw and take off the bypass feed front cover.

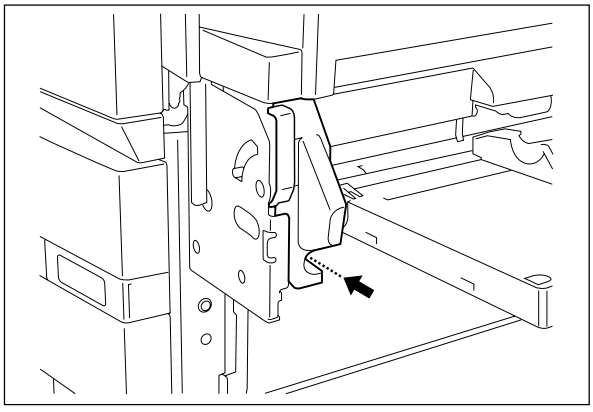


Fig. 10-402

(4) Remove 1 screw and take off the bypass feed rear cover.

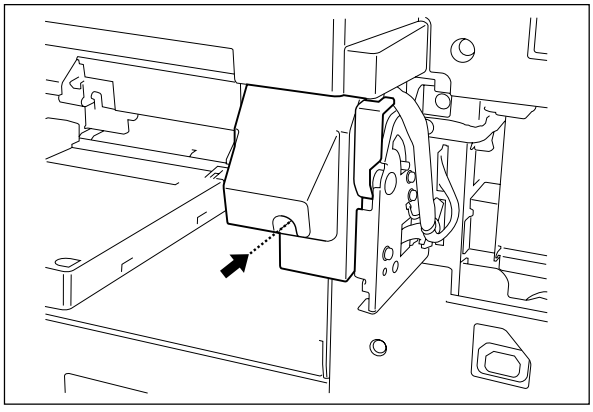


Fig. 10-403

(5) Remove 3 screws. Lift up the bypass unit and take it off toward you.

Note: When installing the bypass unit, make sure that the ADU is closed in advance since the bypass unit occasionally does not slide smoothly.

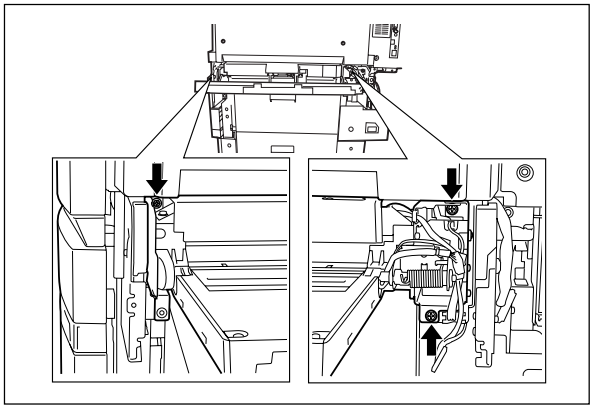


Fig. 10-404

(A-2) Bypass tray slide guide width detection PC board

(1) Release the harness from 1 harness clamp and disconnect 1 connector.

(2) Remove 2 screws and take off the hinge unit.

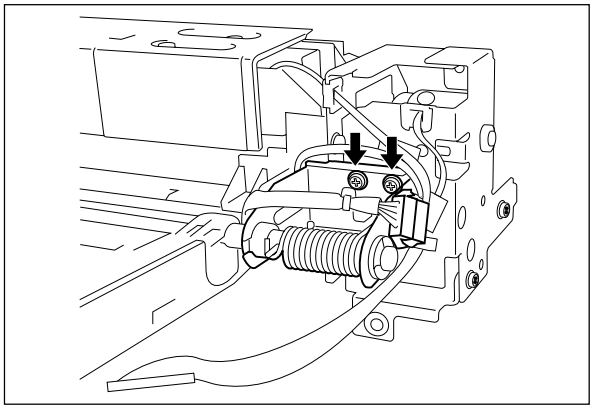


Fig. 10-405

(3) Detach the bypass tray from the protrusion at the fulcrum of the frame.

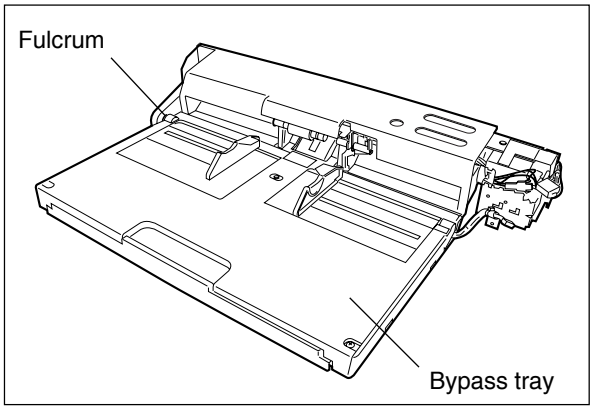


Fig. 10-406

(4) Remove 3 screws and release 4 latches. Take off the upper cover of the bypass tray.

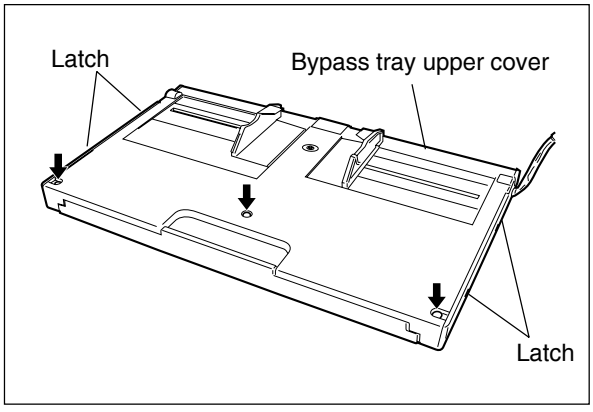


Fig. 10-407

(5) Remove 1 screw and the plate spring.

(6) Remove 1 screw (indicated with a white arrow) from the back side, then take off the bracket.

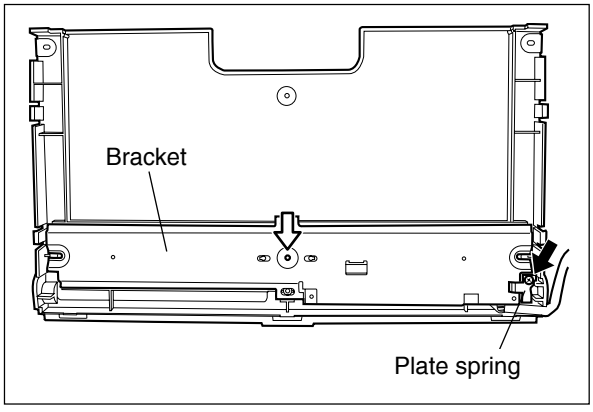


Fig. 10-408

(7) Disconnect 1 connector and remove 1 screw. Take off the bypass tray slide guide width detection PC board.

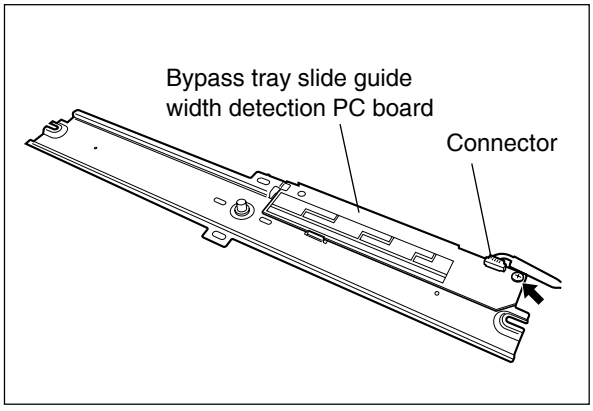


Fig. 10-409

Note: When installing the bracket, make sure that the pointer of the bracket is positioned as shown in the right figure (the same point as it pointed before disassembling).

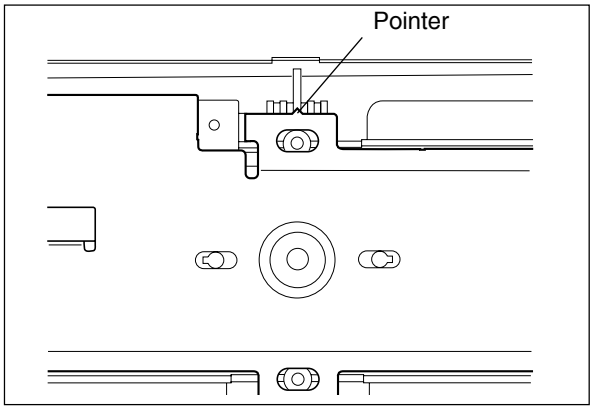


Fig. 10-410

(A-3) Bypass transport roller

(1) Remove 1 E-ring. Slide the shaft and take off the bypass transport roller.

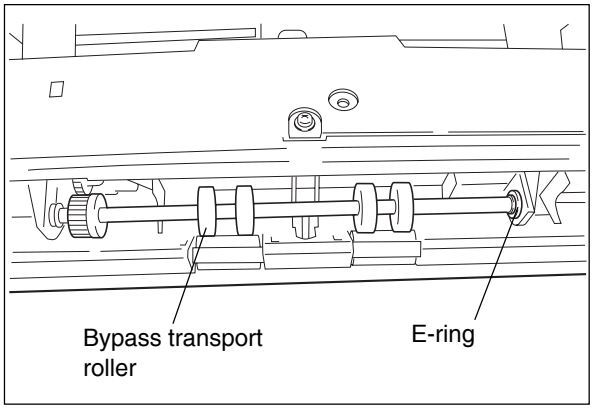


Fig. 10-411

(A-4) Bypass pickup roller PM

(1) Remove 1 screw and take off the bypass feed cover by sliding it.

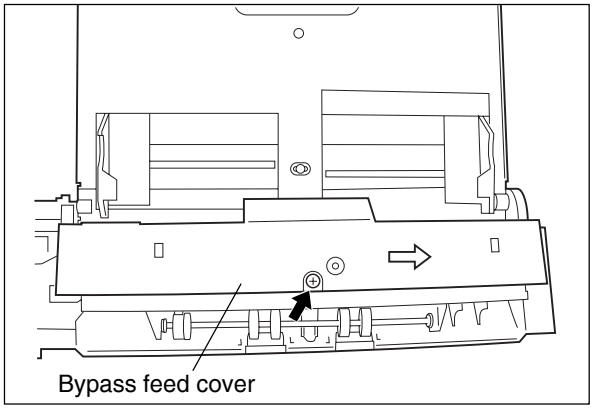


Fig. 10-412

(2) Remove 1 clip and pull out the shaft in the direction of the white arrow. Then take off the bypass pickup roller.

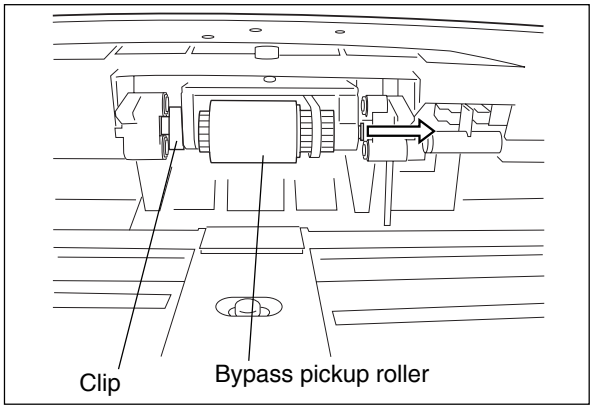


Fig. 10-413

(A-5) Bypass pickup solenoid

(1) Remove 4 screws and take off the plate cover by lifting and sliding it to the direction of the white arrow.

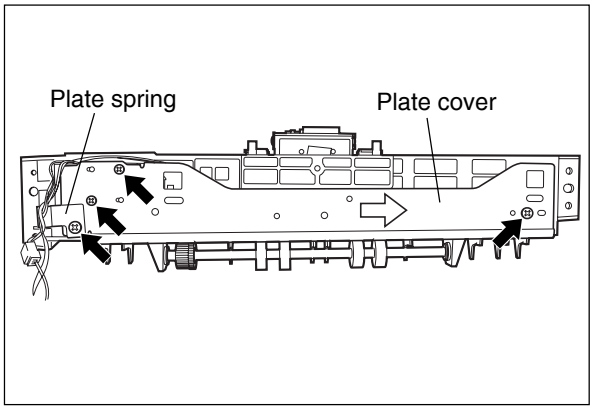


Fig. 10-414

(2) Disconnect 1 connector and remove 1 spring. Then take off the bypass pickup solenoid.

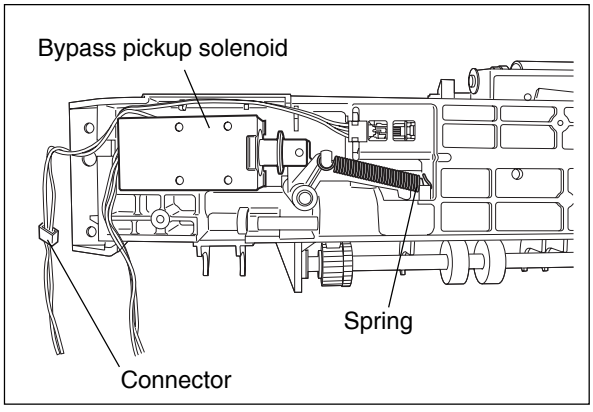


Fig. 10-415

(A-6) Bypass paper sensor

(1) Disconnect 1 connector. Then release the latches and take off the bypass paper sensor.

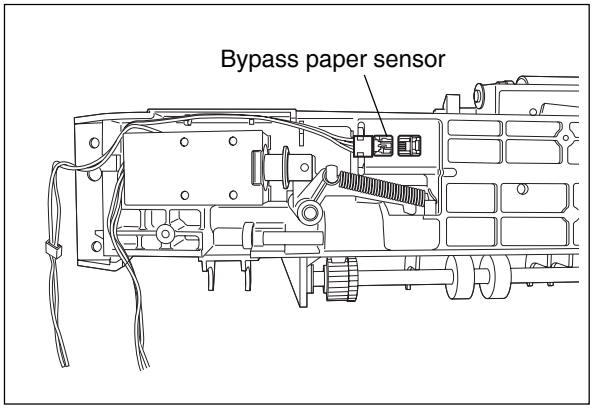


Fig. 10-416

(A-7) Bypass feed roller PM

(1) Remove 4 screws and take off the bypass feed unit.

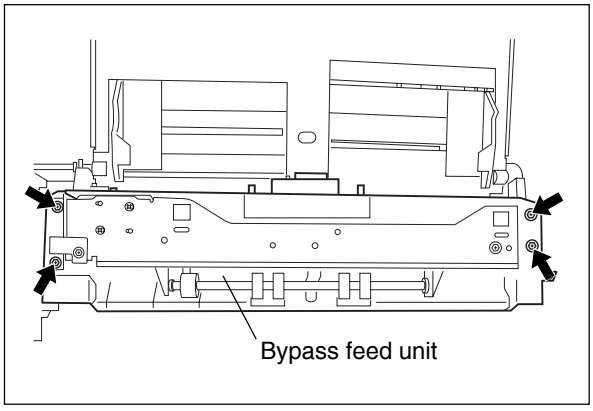


Fig. 10-417

(2) Remove 1 clip and take off the bypass feed roller by sliding it.

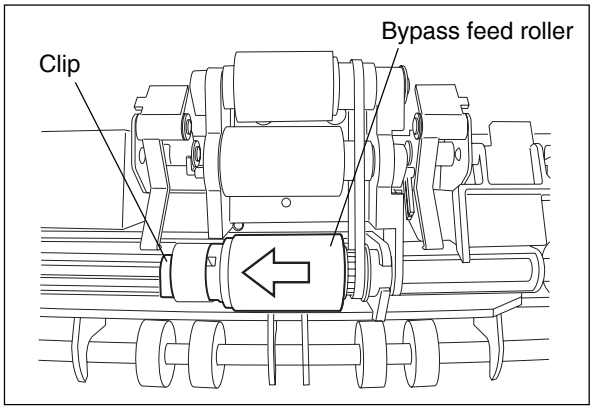


Fig. 10-418

(A-8) Bypass separation roller PM

(1) Remove 3 screws and take off the lower plate cover.

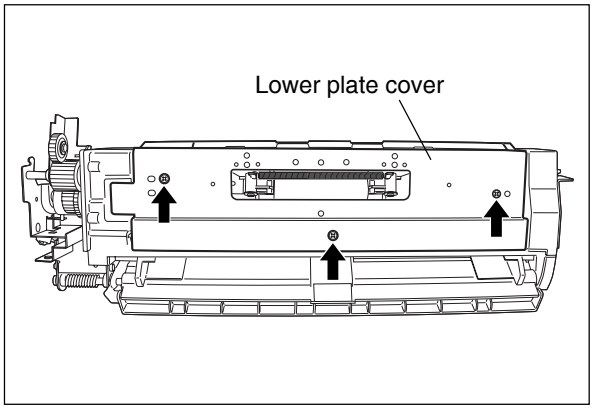


Fig. 10-419

(2) Take off the bypass separation roller.

Note: Lubricate the bypass separation roller on every replacement. Refer to the Service Handbook for more details.

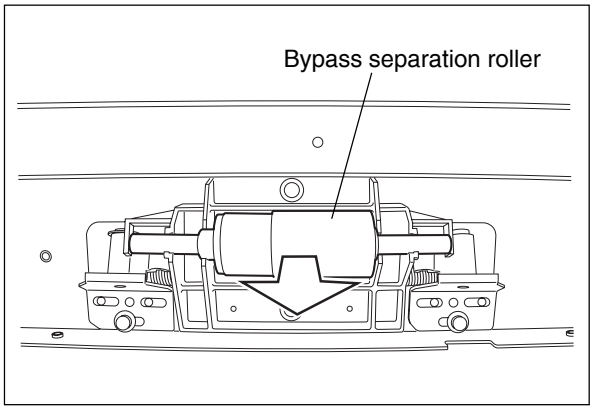


Fig. 10-420

(3) Remove the arbor, shaft and spring.

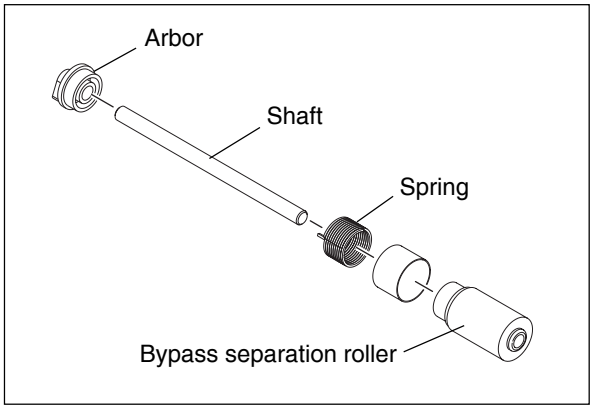


Fig. 10-421

(A-9) Bypass feed sensor

(1) Remove 3 screws and take the lower plate cover.

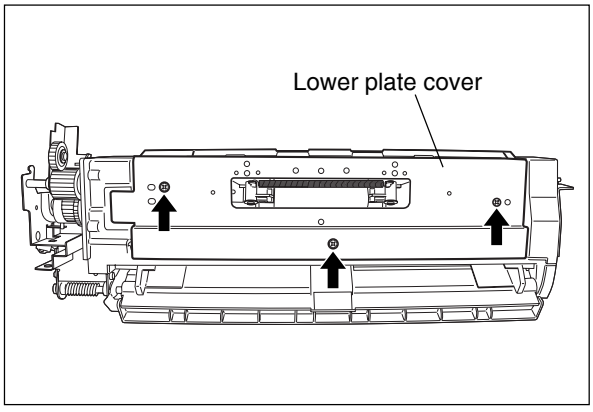


Fig. 10-422

(2) Disconnect 1 connector. Then release the latches and take off the bypass feed sensor.

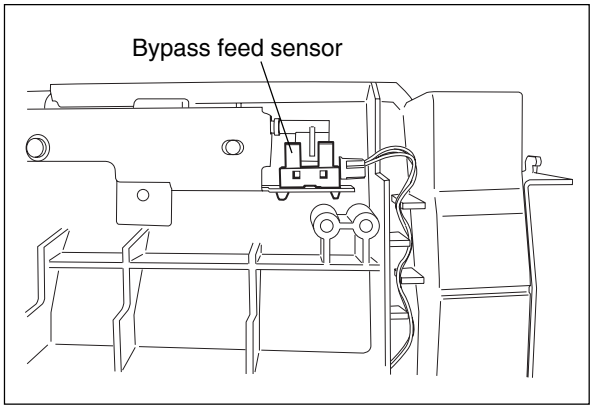


Fig. 10-423

[B] Lower drawer feed sensor/Side cover opening/closing switch

(1) Take off the bypass unit (► Chapter 10.4 [A]).
(2) Take off the ADU (► Chapter 17.5 [A]).
(3) Take off the 2nd transfer unit (► Chapter 14.7 [K]).
(4) Remove 5 screws and take off the stay.

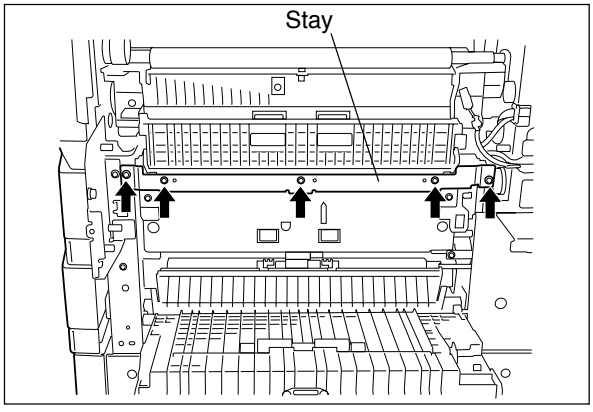


Fig. 10-424

(5) Remove 3 screws and take off the guide by sliding it to the rear side.

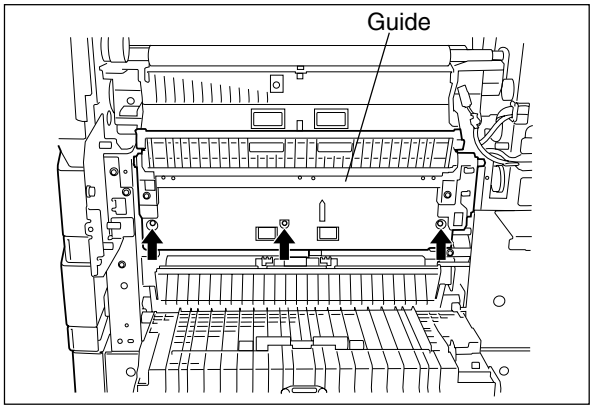


Fig. 10-425

(6) Disconnect 1 connector and take off the lower drawer feed sensor.

(7) Disconnect 1 connector and take off the side cover opening/closing switch.

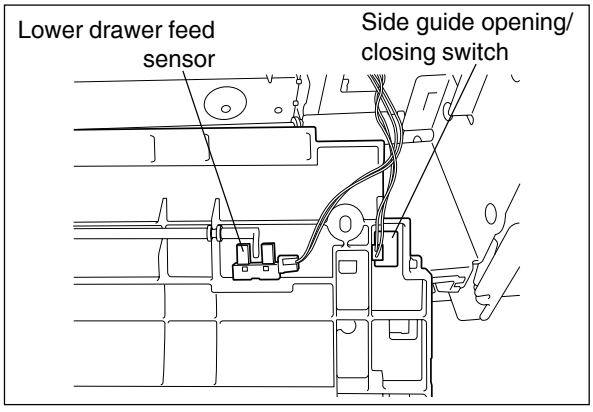


Fig. 10-426

[C] Upper drawer feed sensor/Registration sensor

(1) Remove 1 clip and take off the knob.

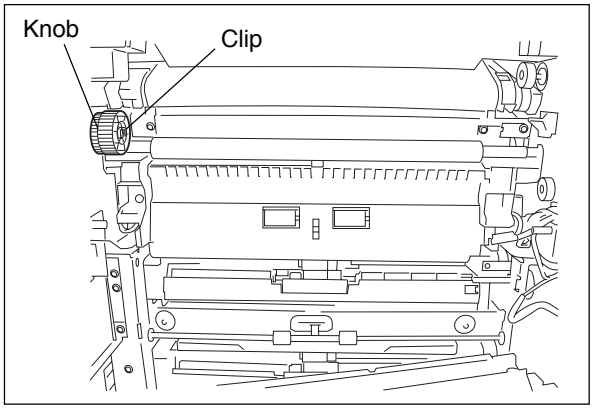


Fig. 10-427

(2) Remove 3 screws. Rotate the guide to take it off by releasing the harness from the harness clamp.

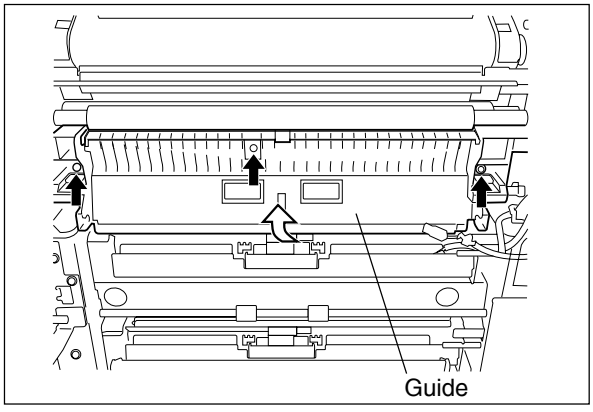


Fig. 10-428

(3) Disconnect 1 connector and remove 1 screw. Then take off the upper drawer feed sensor with the whole bracket.
(4) Disconnect 1 connector and remove 1 screw. Then take off the registration sensor with the whole bracket.

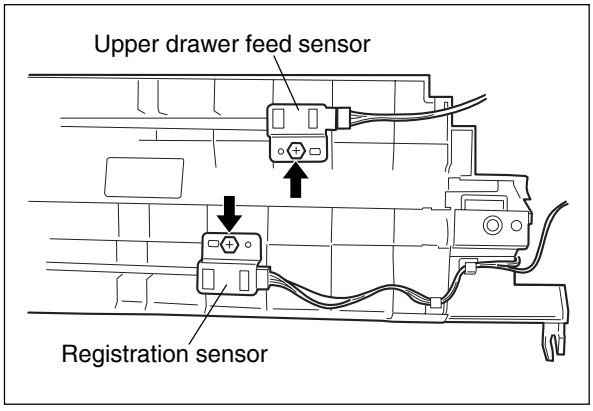


Fig. 10-429

[D] Registration roller

(1) Take off the front right cover (► Chapter 2.5.1 [E]).
(2) Take off the transport motor drive unit (► Chapter 9.5 [B]).
(3) Remove 1 clip and take off the knob.
(4) Remove 1 screw and take off the bracket.

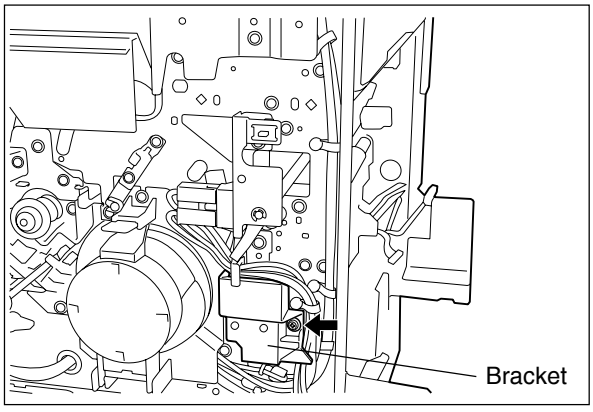


Fig. 10-430

(5) Remove 1 clip and 1 bushing on each front/rear side. Take off the registration roller (rubber roller) by sliding it to the rear side.

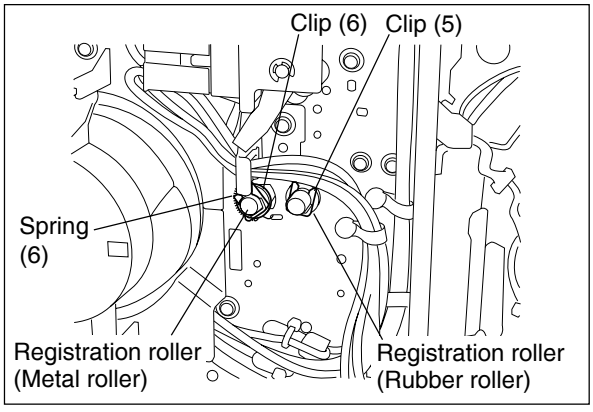


Fig. 10-431

(6) Remove 1 clip, 1 bushing and 1 spring on each front/rear side. Take off the registration roller (metal roller) by sliding it to the rear side.

Note: The spring on the front side differs from the one on the rear side. Note that the spring on the rear side has a black marking. So when installing, be careful not to mix them up.

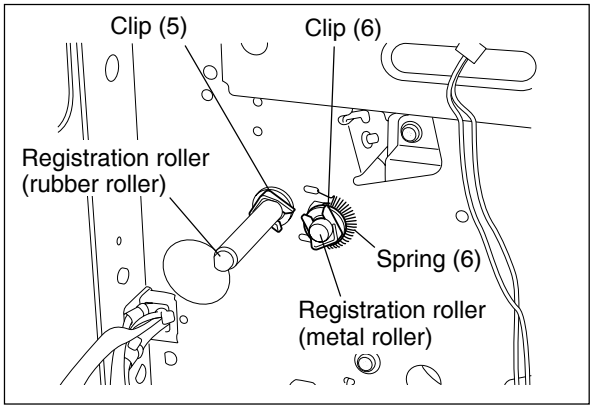


Fig. 10-432

[E] Drawer feeding unit

(E-1) Drawer feeding unit

(1) Remove the drawer.

(2) Remove 1 screw and take off the drawer feeding unit while sliding it to the front side.

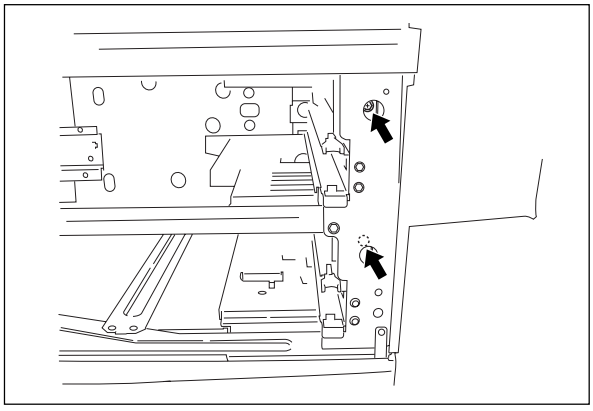


Fig. 10-433

(E-2) Feed clutch

(1) Disconnect 1 connector.

(2) Remove 2 screws and take off the clutch bracket.

(3) Loosen 1 setscrew.

(4) Remove the feed clutch.

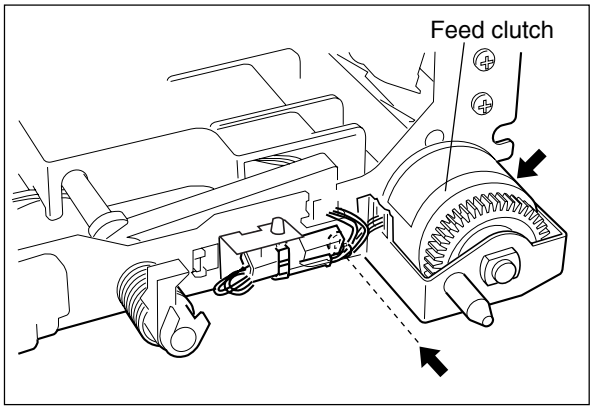


Fig. 10-434

Note: Attach the clutch to the shaft referring to the figure at right.

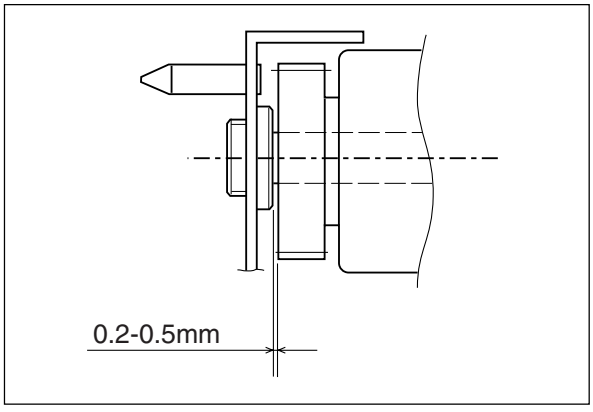


Fig. 10-435

(E-3) Separation roller PM

(1) Remove 1 screw and take off the separation roller holder.

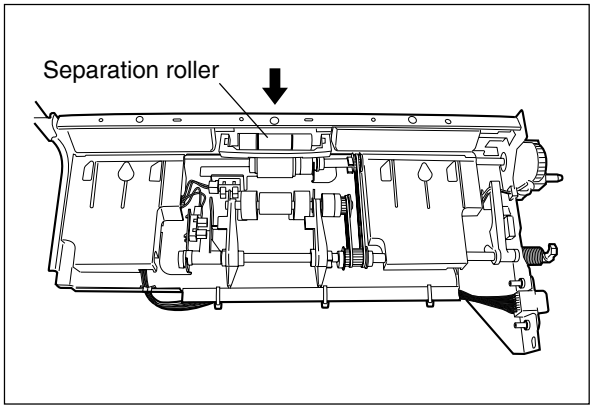


Fig. 10-436

(2) Remove the lever from the holder and take off the separation roller along with its shaft.
(3) Take off the cover, arbor, clutch spring, and then the separation roller from the shaft.

Note: When reassembling the pickup roller, feed roller and separation roller, pay attention to the followings:

1. Set the timing belt securely on the pulleys.
2. Pay attention to the "lock" direction of the one-way clutch.

CLUTCH-6-L

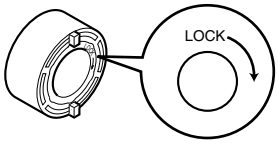


Fig. 10-437

3. Fit the clips securely into the groove on the shaft.
4. Confirm that there is no oil staining etc. on the surface of the timing belt, pulleys and rollers.
5. Pay attention to the mounting direction of the rollers.
6. Lubricate the separation roller on every replacement. Refer to the Service Handbook for more details.

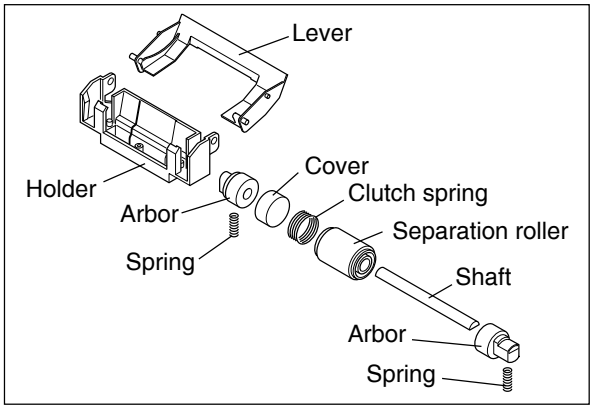


Fig. 10-438

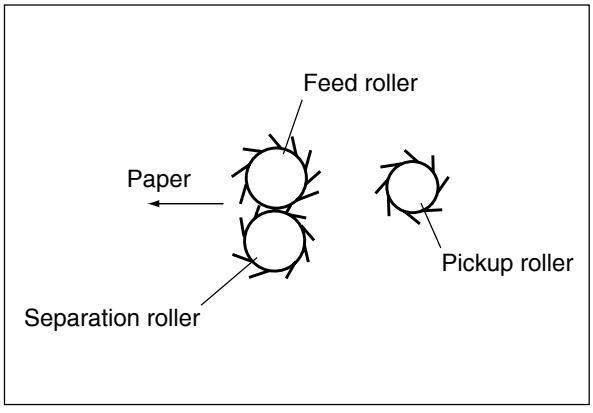


Fig. 10-439

(E-4) Pickup roller PM

(1) Take off the pickup roller from the pickup arm and remove the belt.

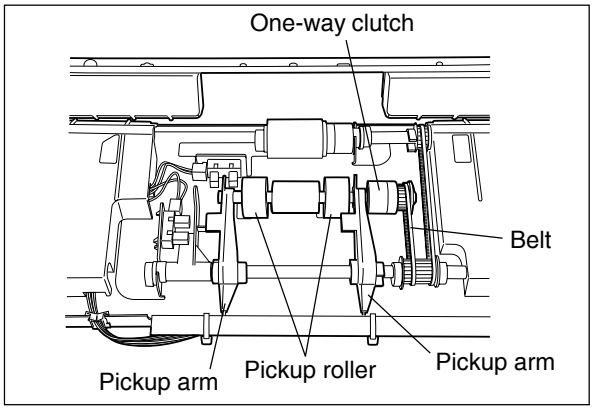


Fig. 10-440

(2) Remove the pulley, one-way clutch and 3 E-rings.

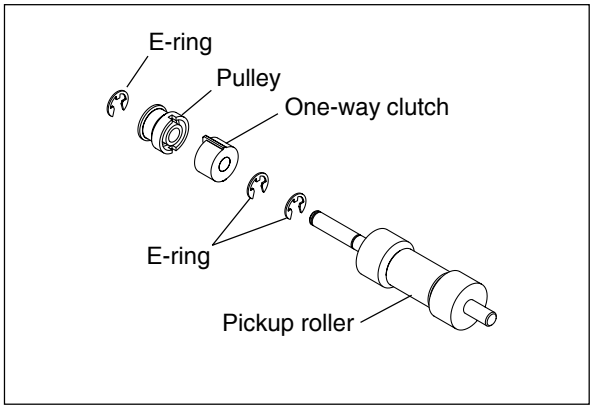


Fig. 10-441

(E-5) Feed roller PM

(1) Remove the clip and take off the feed roller in the direction of the arrow.

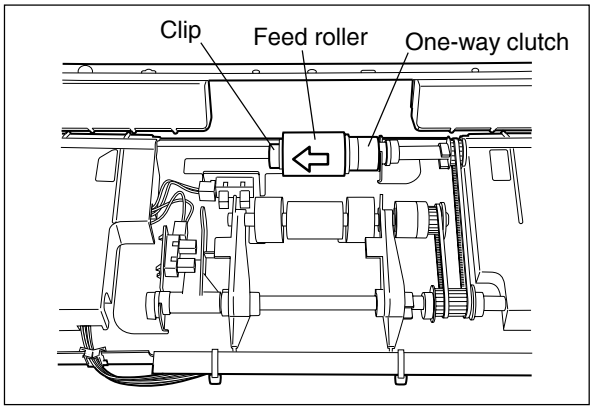


Fig. 10-442

(E-6) Drawer tray-up sensor and Drawer empty sensor

(1) Disconnect the connector and release the latches, and then take off the drawer tray-up sensor.

(2) Disconnect the connector and release the latches, and then take off the drawer empty sensor.

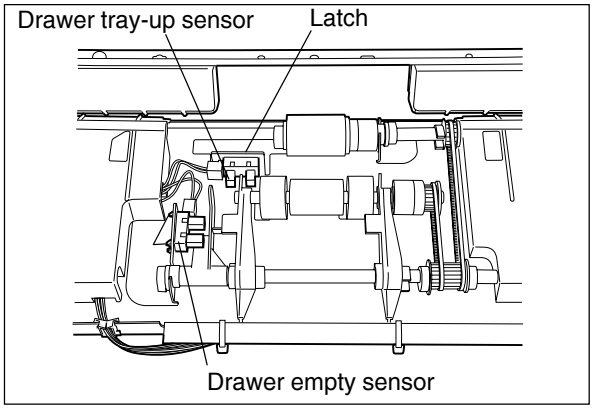


Fig. 10-443

(E-7) Drawer paper stock sensor

(1) Disconnect 1 connector.

(2) Release the latches and take off the drawer paper stock sensor.

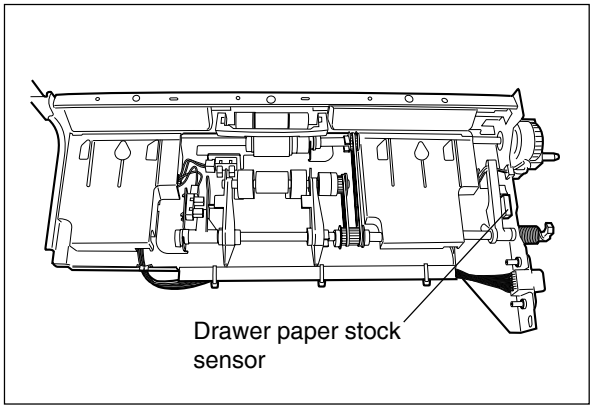


Fig. 10-444

[F] Tray drive unit

(1) Take off the fuse PC board bracket
► Chapter 2.5.2 [H]).

(2) Remove 2 screws and take off the bracket.

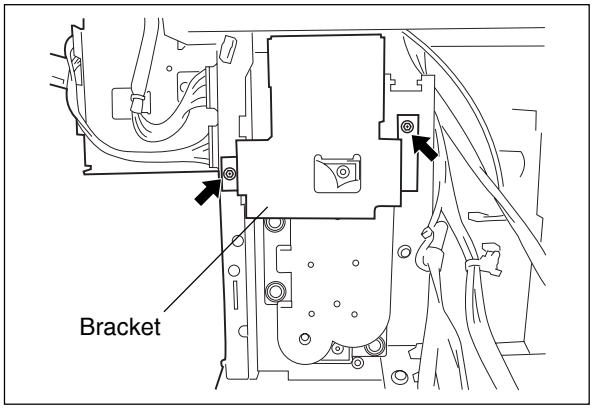


Fig. 10-445

(3) Disconnect 1 connector, remove 4 screws and take off the tray drive unit.

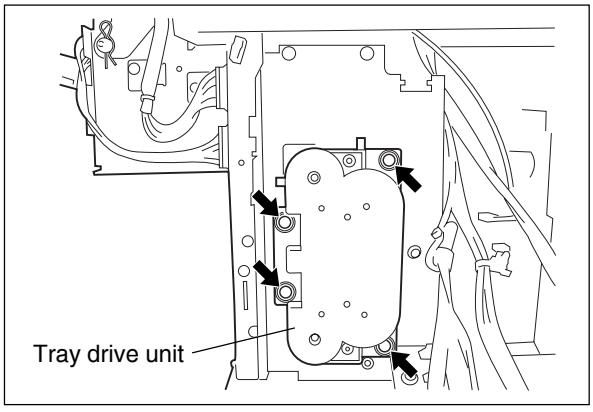


Fig. 10-446

(4) Turn the tray drive unit. Release 6 latches and take off the cover.

Note: When taking off the cover, be careful of the spring inside the tray drive unit which pushes the cover.

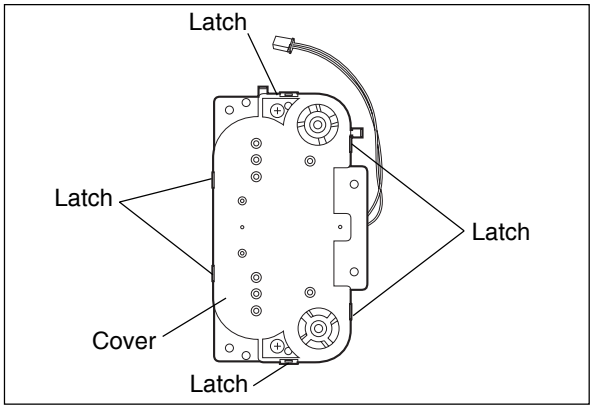


Fig. 10-447

(5) Take off the tray-up motor.

Note: When assembling the tray drive unit, match the gear bosses with the holes of the cover.

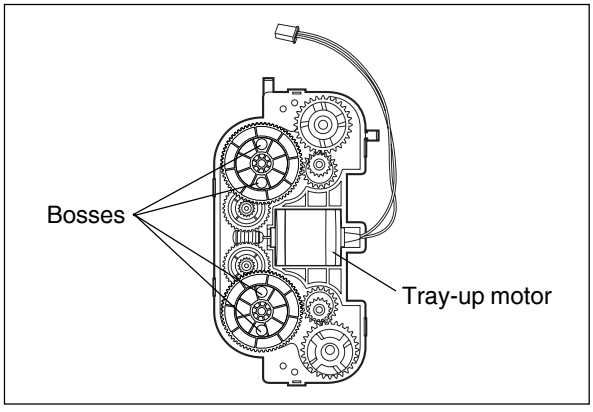


Fig. 10-448

[G] Lower transport clutch (Low/High speed)

(1) Take off the tray drive unit (► Chapter 10.4 [F]).

(2) Remove 4 screws and take off the bracket.

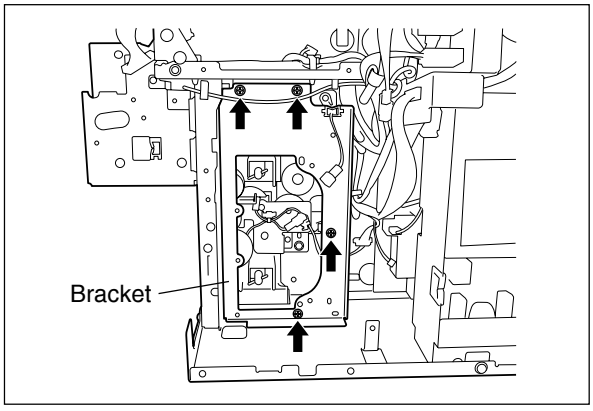


Fig. 10-449

(3) Remove 3 screws and 1 E-ring. Then take off the clutch fixing bracket.

(4) Take off the lower transport clutch (low speed) and the lower transport clutch (high speed).

Notes: 1. Do not push the transport roller shaft strongly when installing the clutch fixing bracket and tighten the screws in the order of (a), (b) and (c). When the installation is finished, open the side cover and check if the transport roller rotates smoothly.

2. Attach the clutch to the shaft referring to the figure on the right.

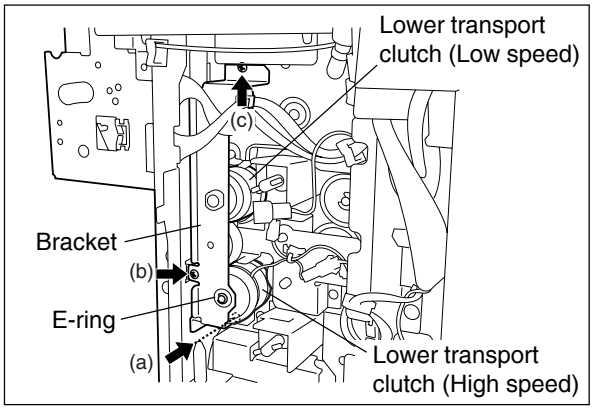


Fig. 10-450

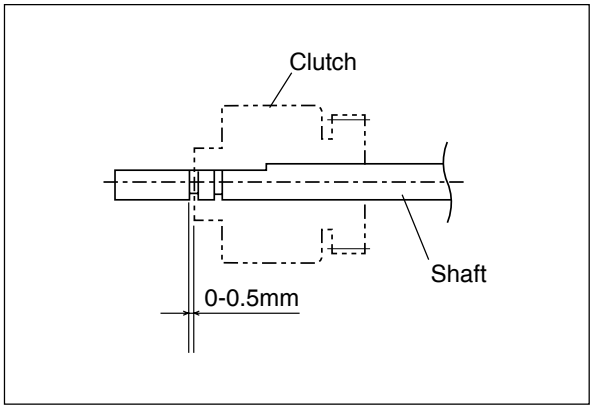


Fig. 10-451

[H] Registration guide PM

(1) Pull out the registration guide by holding its tab on the front side.

(2) Clean the paper dust removal brush attached on the registration guide.

Note: When taking off the registration guide, pay attention not to drop the removed paper dust from the brush into the inside of the equipment.

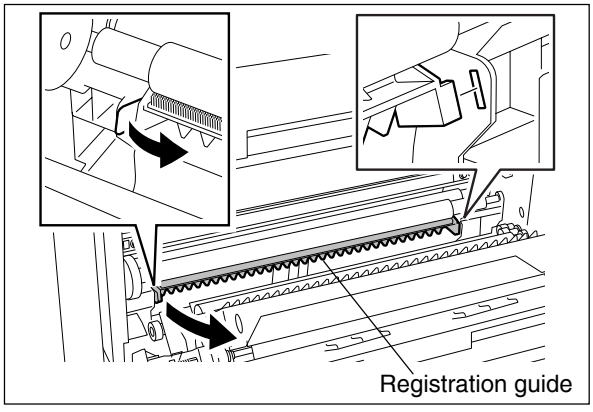


Fig. 10-452

[I] Middle guide PM

(1) Remove 2 screws and take off the 2nd transfer front guide.

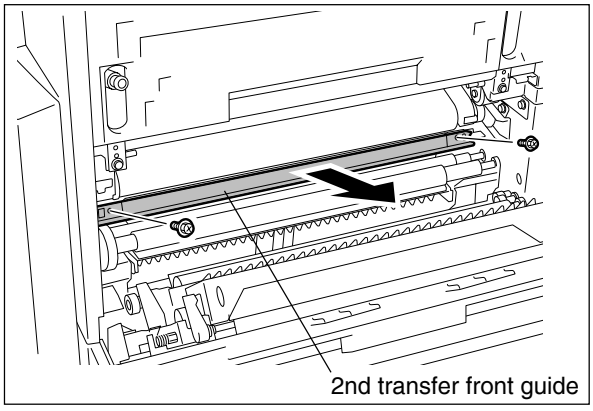


Fig. 10-453

Note: When installing the 2nd transfer front guide, push the 2nd transfer front guide upward and screw it at the position the guide is pushed to the transfer belt unit.

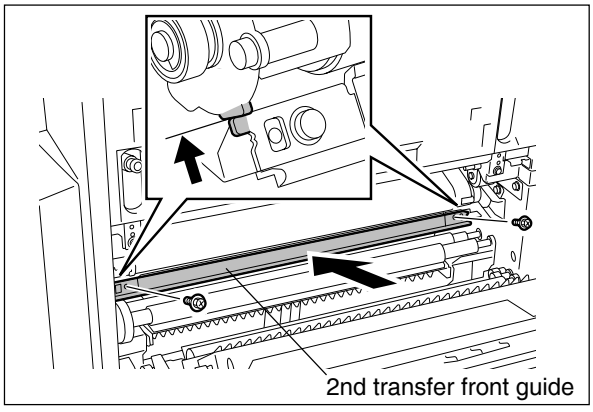


Fig. 10-454

(2) Remove 2 screws and take off the middle guide.

Note: When taking off the middle guide, pay attention not to drop the removed paper dust from the brush into the inside of the equipment.

(3) Clean the paper dust removal brush attached on the middle guide.

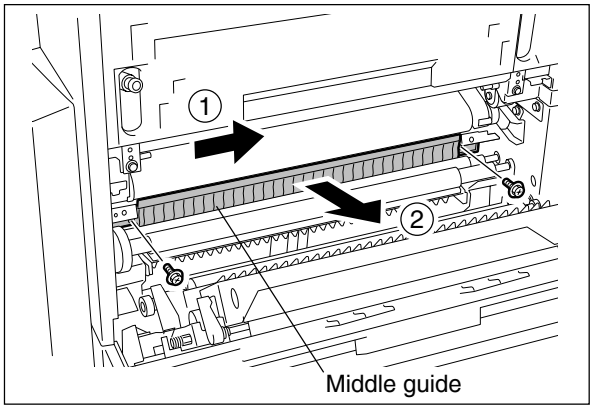


Fig. 10-455

11. DRUM RELATED SECTION

11.1 Construction

This chapter explains about the drum, unit around the drum, image processing unit, their parts and control circuits. This area mainly consists of the following components:

- Drum cleaner unit
  - Drum
  - Main charger
  - Drum thermistor
  - Drum cleaner
    - Cleaning blade
    - Toner recovery blade
    - Toner recovery auger
    - Drum cleaner brush
- Discharge LED unit
  - Discharge LED
  - Ozone exhaust duct
  - Automatic wire cleaning drive unit
- Ozone exhaust fan
- Toner bag / Toner bag full detection sensors-1 & -2
  (Toner volume detection sensor / toner pressure detection sensor)
- High-voltage transformer
- Image quality sensor (► Chapter 15)
- Temperature/Humidity sensor

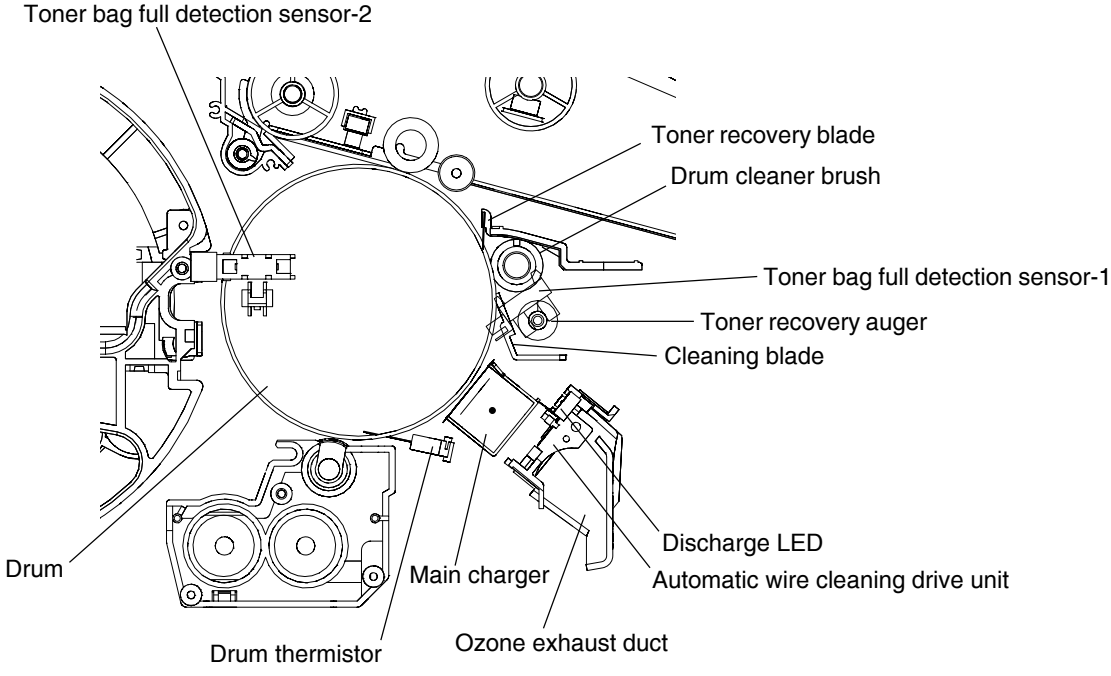


Fig. 11-101

11.2 Functions

(1) Drum

Drum is made of a cylindrical aluminum base coated with thin film of organic photoconductive substance.

Photoconductive object becomes insulative (high electrical resistance) when it is not exposed to lights and becomes conductive (low electrical resistance) when it is exposed to lights. This object is called photoconductor.

(2) Main charger

Main charger consists of a metal rod case having insulated blocks at the both ends with the charger wire attached and the grid is set between them.

When high voltage is applied to the charger wire, the surrounding air is charged (ionized). Then a flow of the ionized air into the drum applies the drum a charge as well. This phenomenon is called “corona discharge” and a control bias is applied to the grid to control the charging amount. Negative charge caused by the corona discharge is applied to the drum surface evenly in dark places. Charger wire is equipped with an automatic wire cleaner to clean the wire.

(3) Drum thermistor

Since the photoconductive characteristic of the drum surface changes depending on the temperature of the drum surface, the drum thermistor detects the temperature of the drum surface and controls to gain the charging potential according to the environment.

(4) Drum cleaner

(a) Cleaning blade

This blade is pressed against the drum surface with a constant force by pressure springs, and scrapes off the residual toner on the drum surface. Also it removes the positive charge on the photoconductive drum by applying negative charge on the blade.

(b) Recovery blade

This blade catches the toner scraped off by the cleaning blade.

(c) Toner recovery auger

This auger carries the residual toner scraped off to the toner bag.

(d) Drum cleaner brush

This brush roller prevents the residual toner and foreign matter adhering to the drum surface.

(5) Discharge LED

Discharge is a process to decrease or eliminate the static electricity on the drum surface.

The electrical resistance of the photosensitive layer is decreased by the light, and the residual charge on the drum surface is neutralized and eliminated (cleaned). Electrical potential of the drum surface is fixed to a certain amount before the drum is charged.

(6) Toner bag

This collects the residual toner scraped off on the drum surface by the cleaning blade and residual toner scraped off on the transfer belt by the transfer belt cleaning blade.

(7) Toner bag full detection sensors-1 & -2

The sensor-2 (transmissive type) finds the toner bag full by detecting the volume of used toner in the toner bag. The sensor-1 detects the toner bag full when it is pushed by the toner recovery auger in the cleaner which is given a pressure from the used toner in the toner bag.

The toner bag full detection sensor-2 also detects the presence/absence of the toner bag.

"Toner bag full" is determined when either of the toner bag full detection sensors-1 and -2 detects full of toner. Printing is interrupted upon the detection of "Toner bag full" status, however, the paper already fed is subject to be printed and exited. When the sensors are in trouble, "Toner bag full" is determined instead of "Call for service". If "Toner bag full" status is not cleared, the sensors, harnesses and LGC board need to be checked.

(8) High-voltage transformer

A circuit generates the output control voltage Vc of the main charger bias, main charger grid bias, 1st transfer roller bias, 2nd transfer roller bias, black developer bias, color developer bias and cleaning blade bias.

(9) Image quality sensor

This sensor measures the reflection amount of the test pattern (toner image) formed on the transfer belt and outputs to the LGC board in order to keep the appropriate image density and line width.

(10) Temperature/humidity sensor

This sensor measures the environment inside the equipment. The values of the temperature and humidity detected inside the equipment are output to the LGC board.

11.3 Output Control Circuits of High-Voltage Transformer

- Outputs adjustment value of the main charger, transfer charger, and developer biases in the NVRAM to the main processor.

  ↓

- Outputs control voltage data from the main processor to the D/A converter.

  ↓

- Analog conversion by the D/A converter.

  ↓

- Outputs control voltage Vc to the main charger grid bias, 1st transfer roller bias, 2nd transfer roller bias, color developer bias and black developer bias transformer.

  ↓

- The main charger bias, 1st transfer roller bias, 2nd transfer roller bias, color developer bias and black developer bias transformers generate output current or voltage proportional to the control voltage Vc with the output ON signal.
  * Adjustment of the control voltage Vc (change of adjustment data) is performed in the Adjustment Mode (05).
  * Output value of the cleaning blade bias is fixed when the transformer board is shipped from the factory.

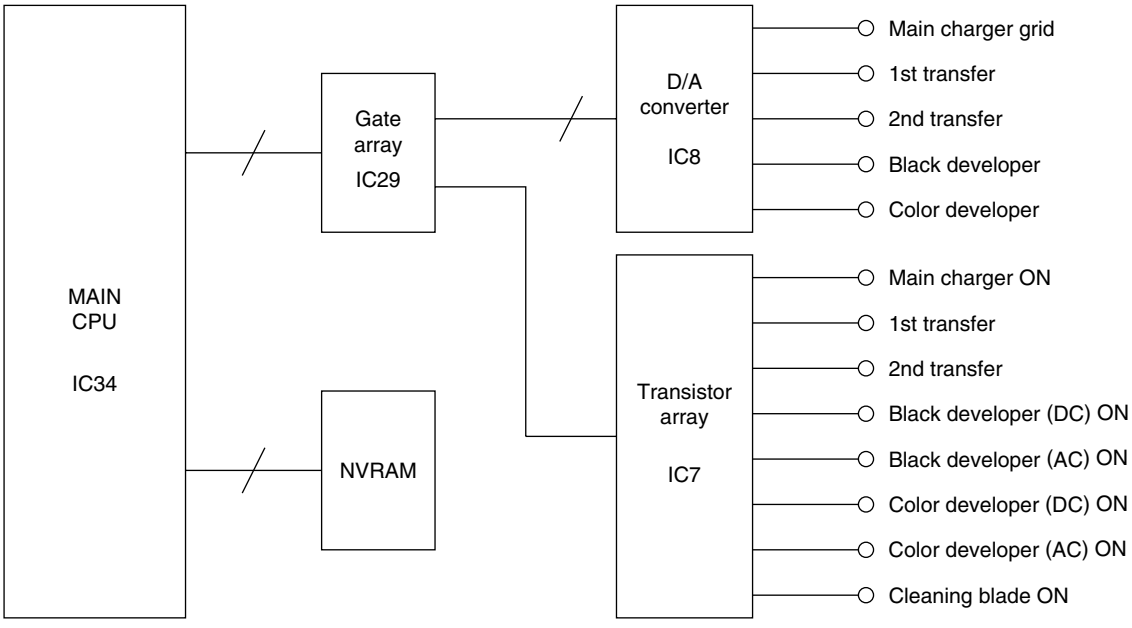


Fig. 11-301

11.4 Drum Temperature Detection Circuit

(1) Purpose of the drum temperature detection circuit

Since the photoconductive characteristic of the drum surface varies drastically depending on the surface temperature of the drum, this circuit detects the temperature of the drum surface to gain the charging potential according to the environment.

(2) Configuration of the drum temperature detection circuit

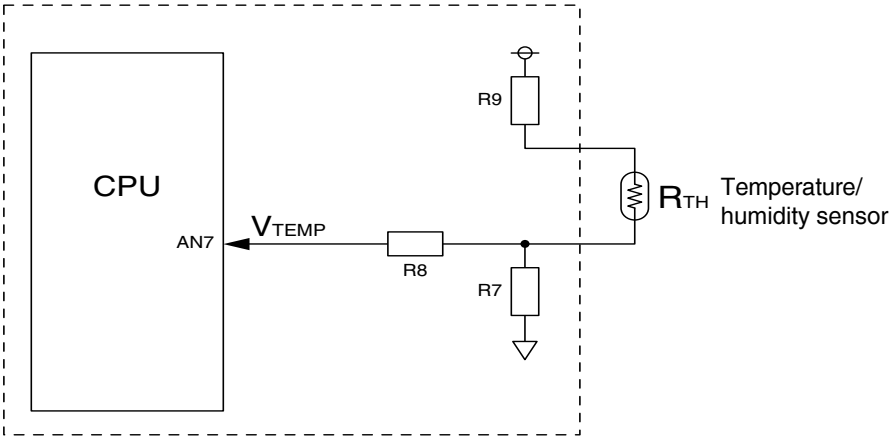


Fig. 11-401

11.5 Temperature/Humidity Sensor

11.5.1 General description

This sensor measures the temperature and humidity inside the equipment.

11.5.2 Construction

Temperature/humidity control circuit is configured as follows:

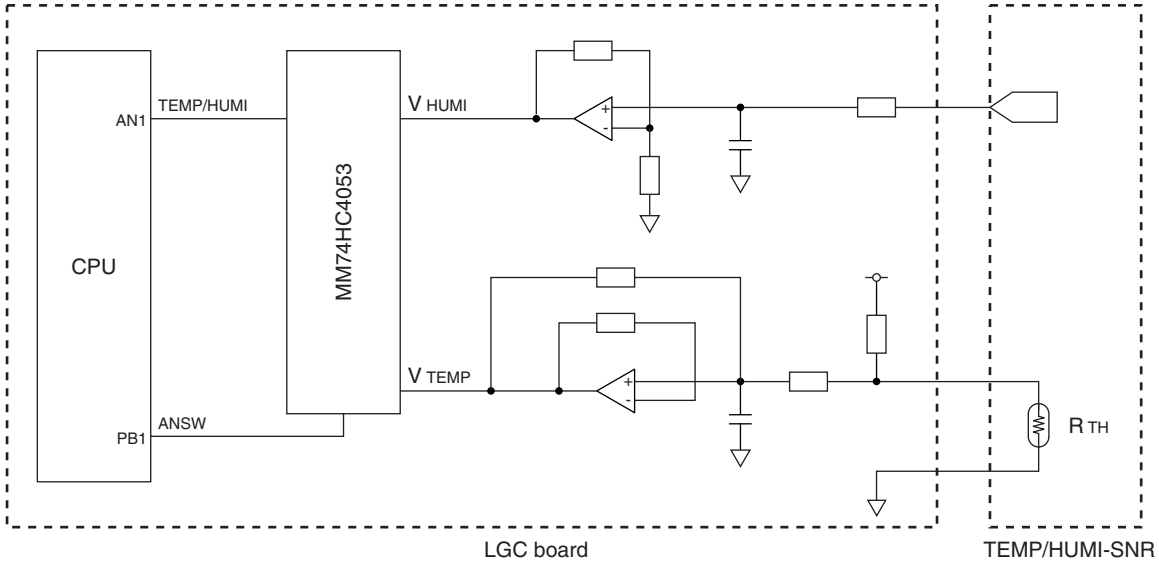


Fig. 11-501

11.6 Charger Wire Cleaner

11.6.1 Operation

This equipment includes an automatic cleaning function with a motor drive to automatically clean off the toner adhered on the main charger wire. The drive from charger wire cleaner motor is transmitted to the wire cleaner through the timing belt and the wire cleaner contacted by the main charger wire shuttles between the both ends of main charger wire. The waiting position (home position) of the wire cleaner is at the front side. The wire cleaner and main charger wire are not contacted each other at the waiting position.

The cleaning movement is performed in the cases as follows:

(1) When the power is turned ON
(2) When recovered from the energy saving mode
(3) When opening/closing the front cover
(4) When the specified number of pages has been printed out (default value: 1,000 pages) from the last cleaning (If the number of pages has reached the setting value during continuous printing, the cleaning movement is performed upon the completion of this printing job.)

11.6.2 Construction

(1) Charger wire cleaner motor

This motor is a DC brush motor and supplies the drive to the wire cleaner. When the motor rotates in reverse, the wire cleaner shifts to the rear side. Also when the motor rotates normally, the wire cleaner shifts to the front side.

(2) Charger wire cleaner front position detection switch

This switch detects whether the wire cleaner has reached to the front position (home position) or not. The wire cleaner is always waited at this position except during cleaning movement.

(3) Charger wire cleaner rear position detection switch

This switch detects whether the wire cleaner has reached to the rear position or not. When this switch is turned ON, the charger wire cleaner motor rotates normally. Then the wire cleaner shifts to the front position (home position).

11.6.3 Drive circuit

The circuit configuration is as shown below.

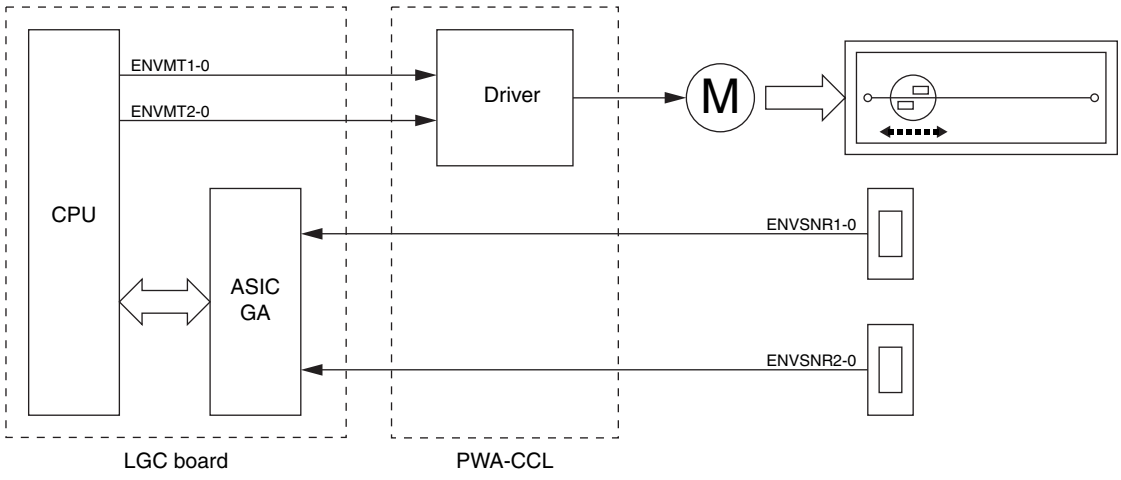


Fig. 11-601

11

Signal level of motor circuit

Signal \ Motor	OFF	Reverse rotation	Normal rotation	Brake
ENVMT1-0 Wire cleaner drive signal-1	L	L	H	H
ENVMT2-0 Wire cleaner drive signal-2	L	H	L	H

Signal level of switching circuit

Signal \ Level	L	H
ENVSNR1-0 Charger wire cleaner front position detection signal	Charger wire cleaner is at the front position	Charger wire cleaner is at the position other than the front position
ENVSNR2-0 Charger wire cleaner rear position detection signal	Charger wire cleaner is at the rear position	Charger wire cleaner is at the position other than the rear position

11.7 Disassembly and Replacement

[A] Cleaner unit

(1) Open the front cover. Take off the toner bag and black developer unit cover (► Chapter 2.5.1 [A], 12.8 (A-1)).

(2) Remove 1 screw and take off the sensor cover.

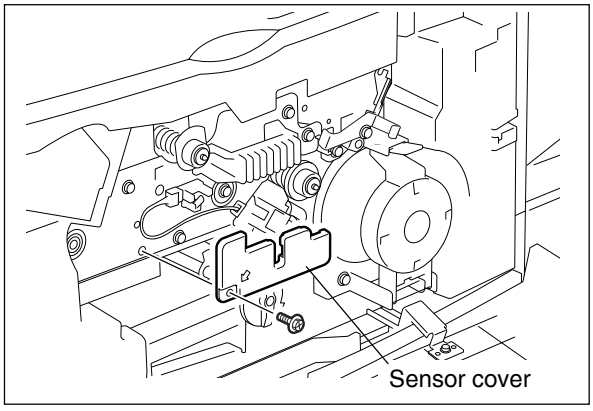


Fig. 11-701

(3) Remove 3 screws.

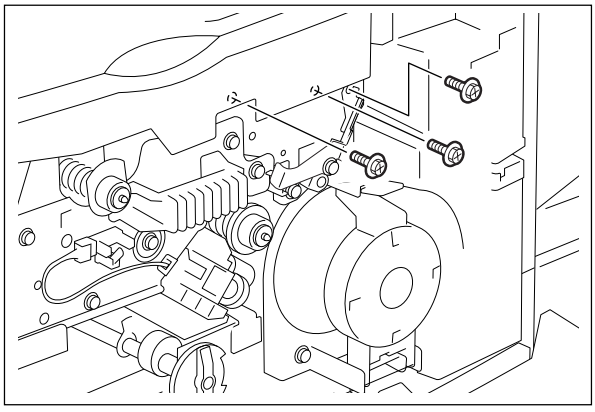


Fig. 11-702

(4) Loosen 2 screws.

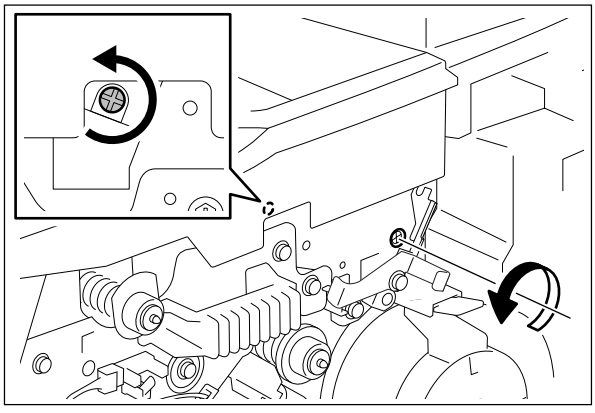


Fig. 11-703

(5) Rotate the lever counterclockwise to screw it again.

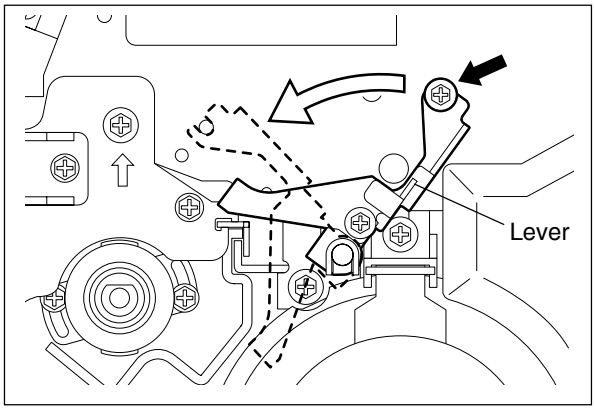


Fig. 11-704

(6) Disconnect 2 connectors. Remove 3 screws and washer and pull out the cleaner unit.

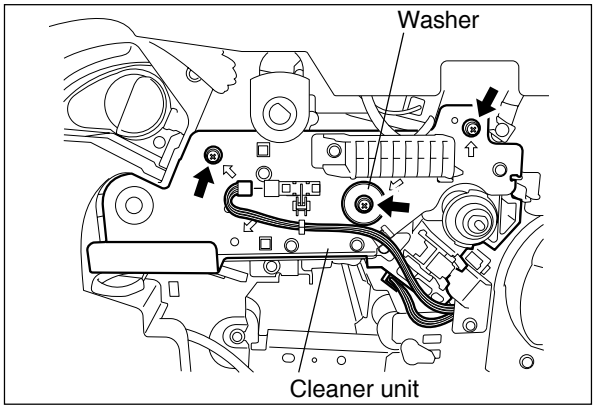


Fig. 11-705

Notes: 1. When pulling out the drum cleaner unit, pull out straightly without leaning.

2. When pulling out the drum cleaner, check whether color developer is taking the regular position (the position where color toner cartridge can be pulled out from the front) or not. If it is not taking the regular position, rotate the revolver unit to the regular position.

3. If the transfer belt drive gear is not properly engaged, take off the receiving tray, and then press the unit down until the unit is securely fixed (as shown in the figure at right) to engage the transfer belt drive gear.

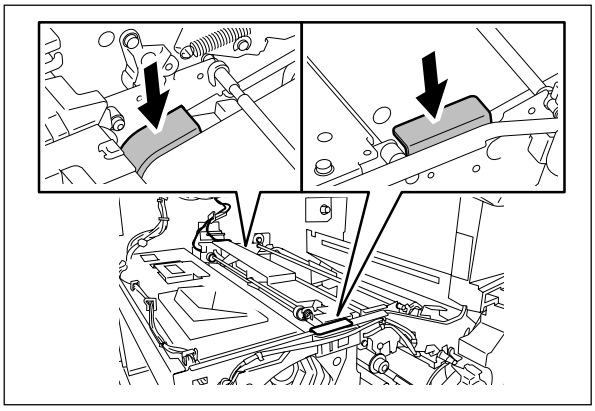


Fig. 11-706

4. If the transfer belt drive gear is not properly engaged, the hole positions of the fixing screw (as shown in the figure at right) may not match. In this case, operate the main motor for approx. 1 second in the Test Mode (03-101) to engage the drive gear securely and then install the unit.

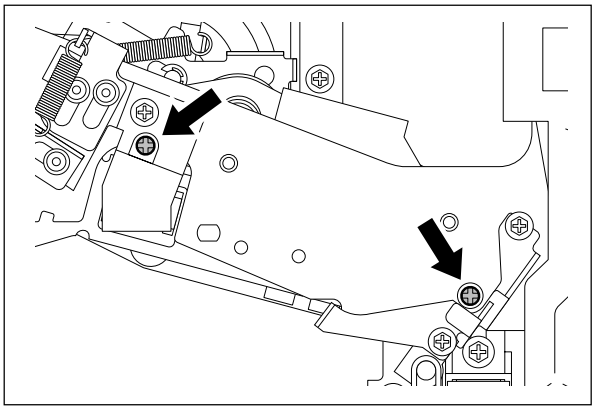


Fig. 11-707

[B] Main charger unit

(B-1) Main charger unit

(1) Take off the cleaner unit (► Chapter 11.7 [A]).

(2) Rotate the gear counterclockwise for more than 1 turn.

(3) Release the latches and take off the main charger unit.

Notes: 1. At this time, be careful not to touch the drum surface or damage the drum.

2. When installing the main charger unit, rotate the gear counterclockwise for more than 1 turn until the holder arm is completely hidden inside to install the unit.

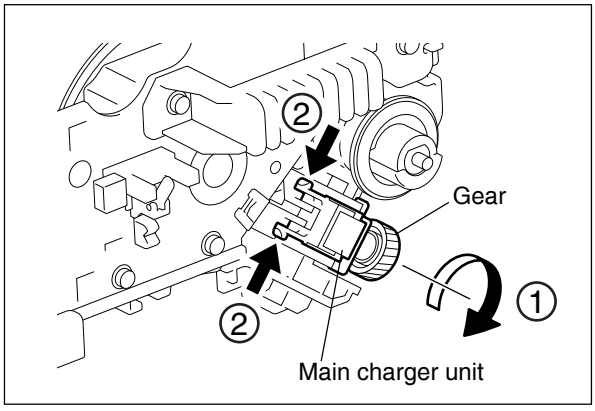


Fig. 11-708

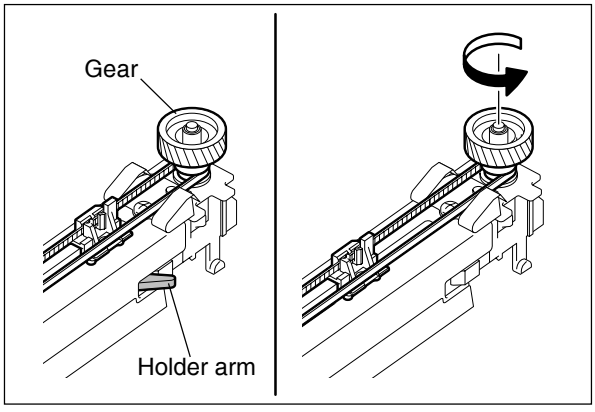


Fig. 11-709

(B-2) Main charger grid PM

(1) Push the terminal head at the front side and remove the grid.

Note: Do not touch the mesh area of the grid.

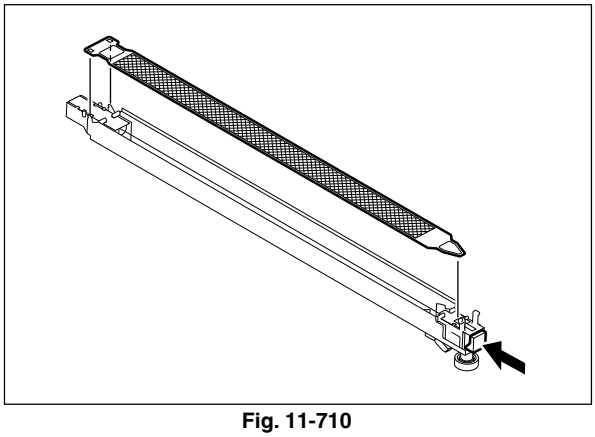


Fig. 11-710

(B-3) Charger wire PM

* Length: 373 mm, tungsten wire diameter 0.06 mm

(1) Take off the terminal covers of the front and rear sides.

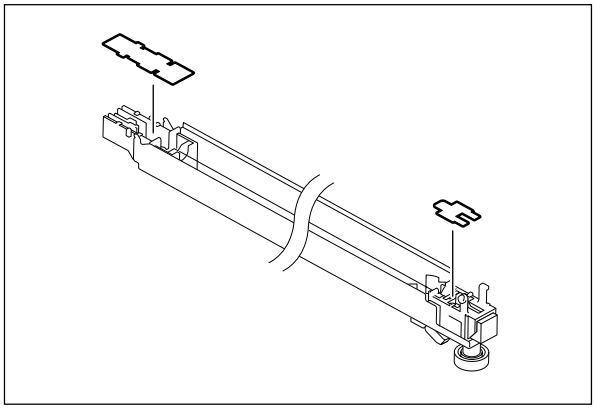


Fig. 11-711

(2) Remove the terminal, detach the spring and take off the wire.

Notes: Be careful of the followings when attaching the wire.

1. Securely insert the wire into the V-grooves of the front and rear sides.
2. Do not twist the wire.
3. Do not touch the wire directly with bare hands.

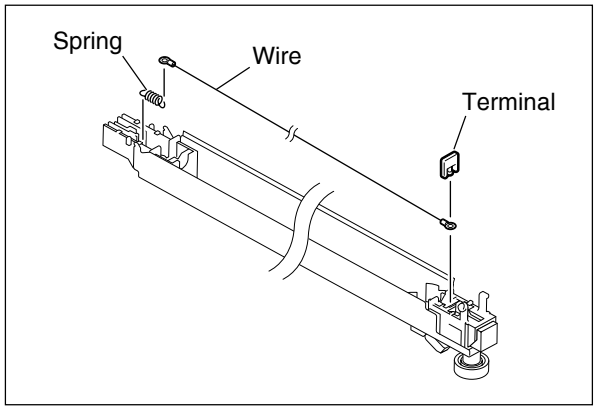


Fig. 11-712

(B-4) Wire pad PM

(1) Take off the charger wire (► Chapter 11.7 (B-3)).

Note: When installing, pay attention to the direction of the wire pad.

(2) Release the latch and remove the wire pad.

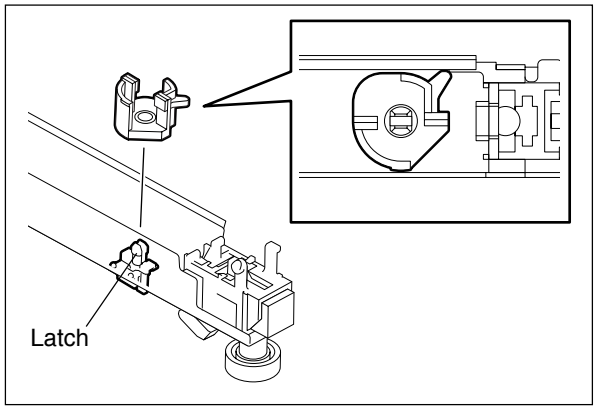


Fig. 11-713

(3) Remove 1 screw and take off the pad guide.

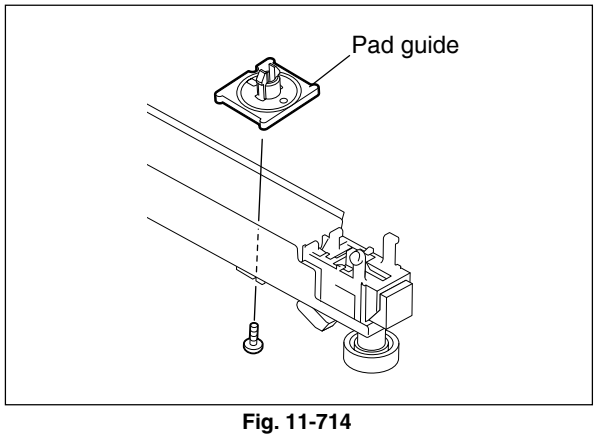


Fig. 11-714

(4) Remove the base.

Note: Reinstall the base at the same position on the belt as before removing. It is recommendable to leave the mark on the belt in advance.

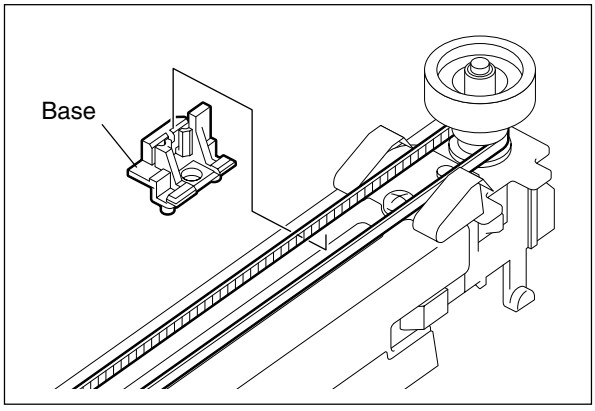


Fig. 11-715

[C] Drum PM

(1) Take off the cleaner unit (► Chapter 11.7 [A]).

(2) Remove 3 screws and take off the bracket.

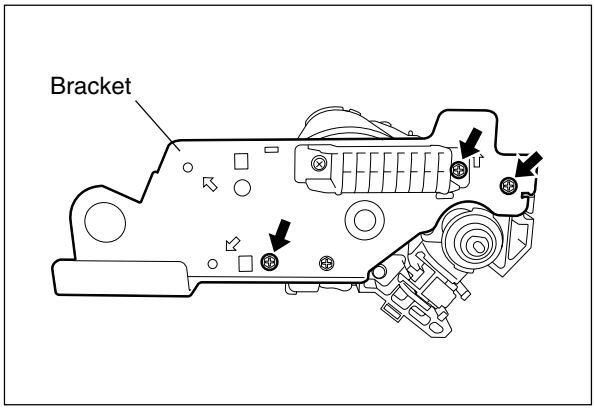


Fig. 11-716

(3) Take off the drum upward by sliding it toward the front side.

Notes: 1. Do not touch, scratch or spit on the drum surface.

2. Try to avoid direct sunlight to the drum. Lay it on the dark place immediately after taking off.
3. Do not touch the drum thermistor during the disassembly and replacement.
4. Do not touch or damage the edge of the cleaning blade.
5. When replacing the drum, take off the drum shaft bearing from the old drum and install it on the new drum.
6. Check the color deviation after replacing the drum.

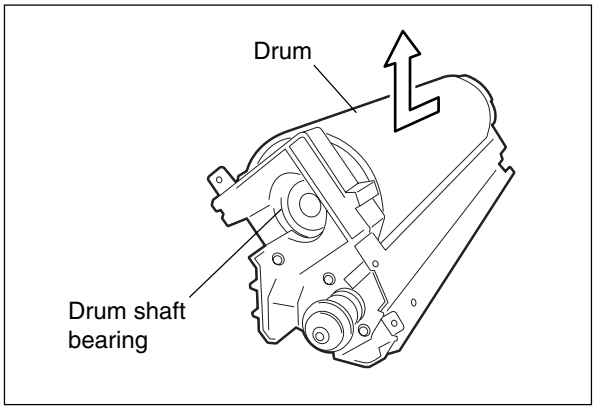


Fig. 11-717

[D] Cleaner

(D-1) Drum cleaning blade PM

(1) Take off the main charger unit and drum.
(► Chapter 11.7 (B-1) [C])

(2) Remove 3 screws and the cleaning blade.

Notes: 1. Do not touch or damage the edge of the cleaning blade.
2. Check the color deviation after replacing the drum cleaning blade.

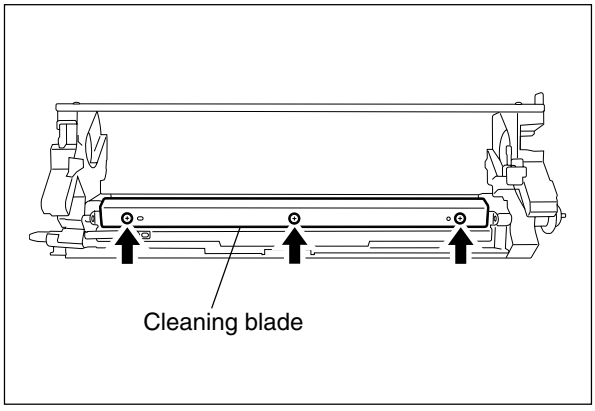


Fig. 11-718

(D-2) Recovery blade

(1) Remove the recovery blade.

Notes: 1. To attach the recovery blade, clean the surface of the frame beforehand to make sure not to deform the blade.
2. Attach the recovery blade while pushing it to the step on the surface of the frame.
3. Press the stuck part with your finger to attach the blade securely.

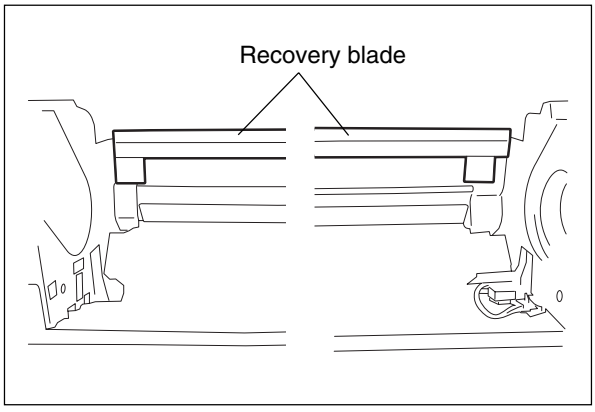


Fig. 11-719

(D-3) Drum cleaner brush PM

(1) Unlock the lever by rotating it and pull it out.

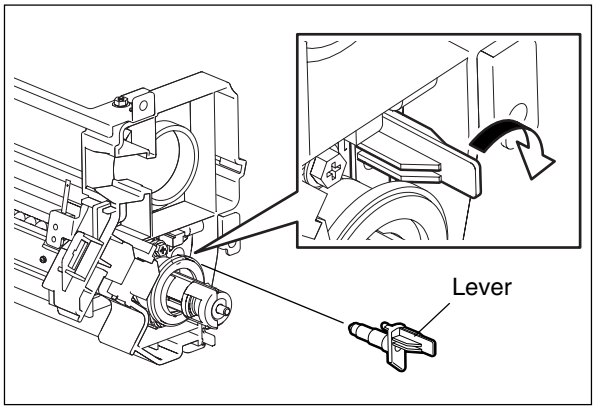


Fig. 11-720

(2) Remove the drum cleaner brush.

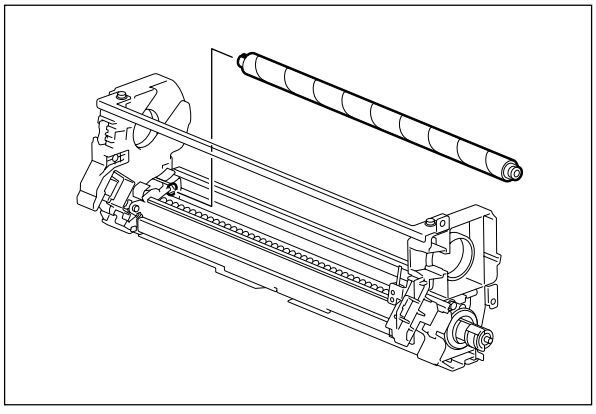


Fig. 11-721

[E] Drum thermistor

(1) Take off the drum (► Chapter 11.7 [C]).

(2) Remove 1 screw and disconnect 1 connector, and then take off the drum thermistor with the whole bracket.

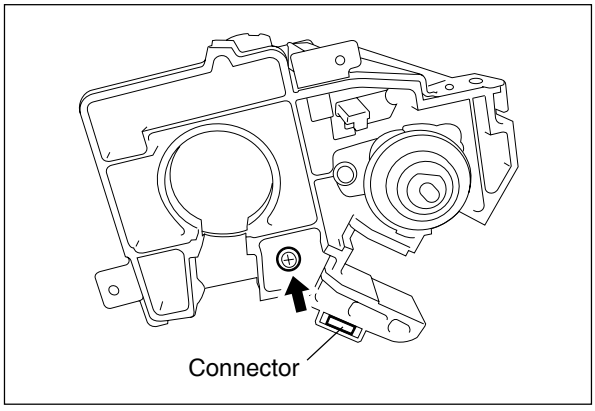


Fig. 11-722

(3) Remove 1 screw and take off the drum thermistor.

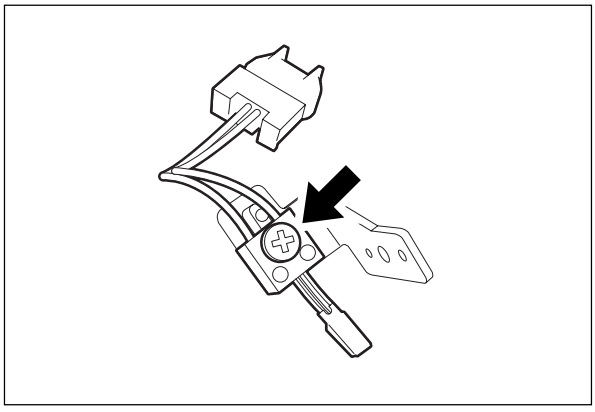


Fig. 11-723

[F] Discharge LED unit

(F-1) Discharge LED

(1) Take off the black developer unit and cleaner unit (► Chapters 12.8 [A] and 11.7 [A]).

(2) Remove 2 screws and lift up the discharge LED unit. Disconnect 2 connectors, then take off the discharge LED unit.

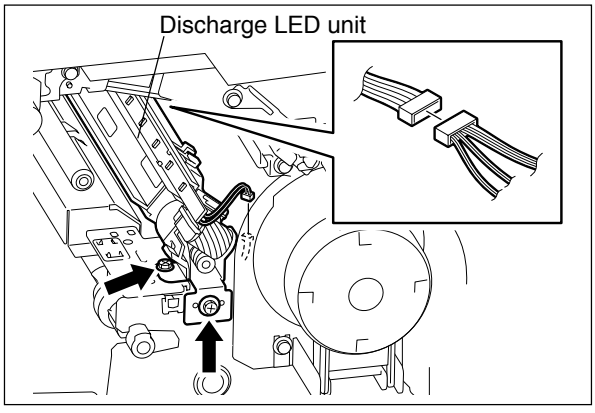


Fig. 11-724

(3) Remove the discharge LED.

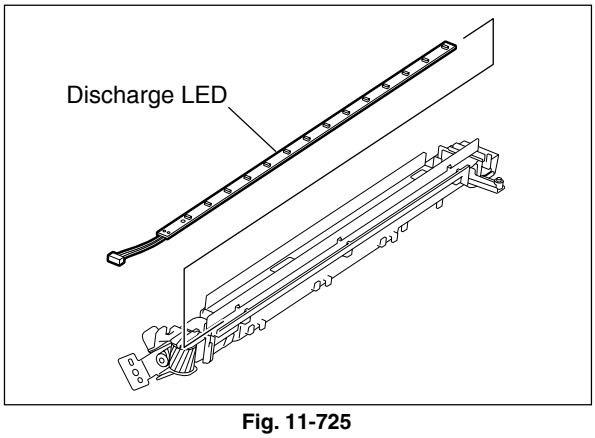


Fig. 11-725

(F-2) Charger cleaner motor

(1) Take off the discharge LED unit (► Chapter 11.7 (F-1)).

(2) Disconnect the joint connector of the charger cleaner motor.

(3) Remove 1 screw and take off the charger cleaner motor unit.

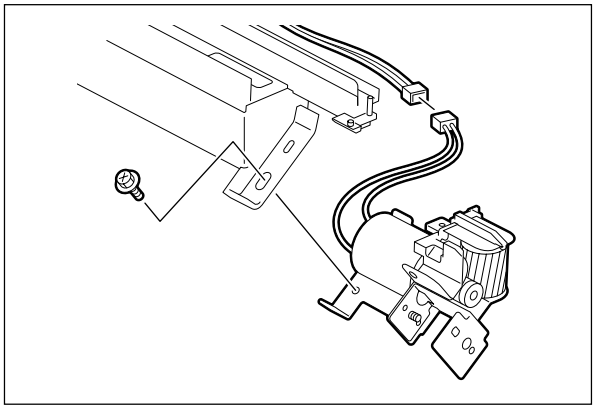


Fig. 11-726

(4) Remove 2 screws and take off the gear bracket and motor guide.

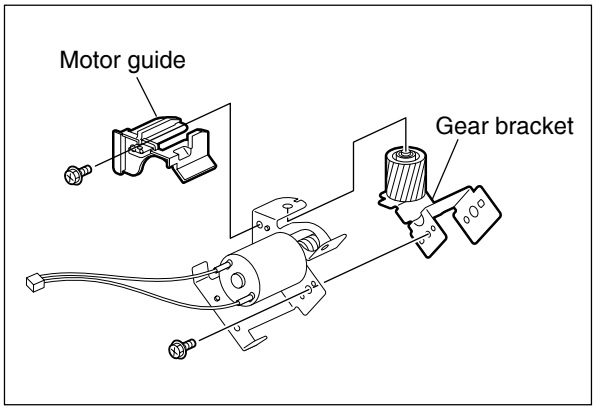


Fig. 11-727

(5) Remove 2 screws and take out the charger cleaner motor from the motor bracket by rotating it upward.

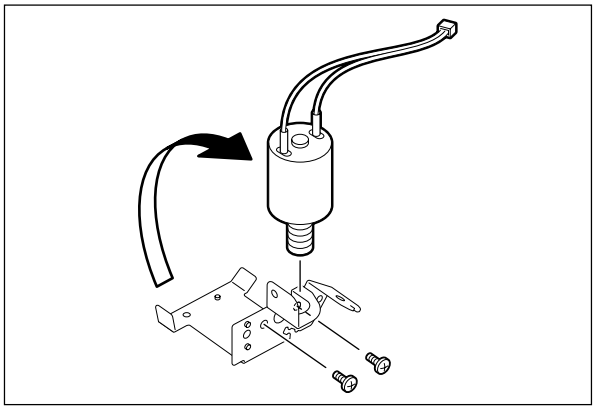


Fig. 11-728

(F-3) Charger cleaner detection switch

(1) Take off the charger cleaner motor unit (► Chapter 11.7 (F-2)).

(2) Separate the discharge LED unit into two parts.

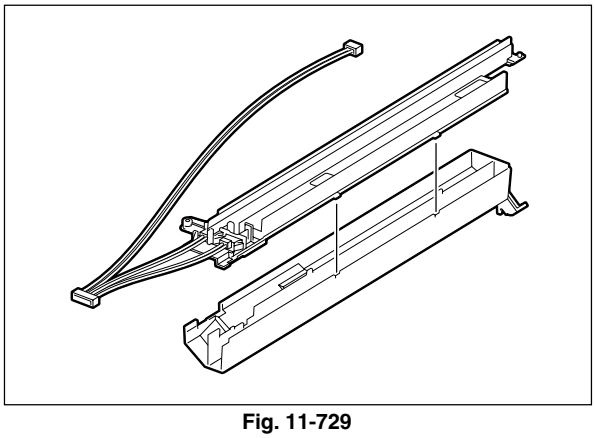


Fig. 11-729

(3) Release 2 latches and take off the front position switch arm.
(4) Remove 1 screw and take off the rear position switch arm.

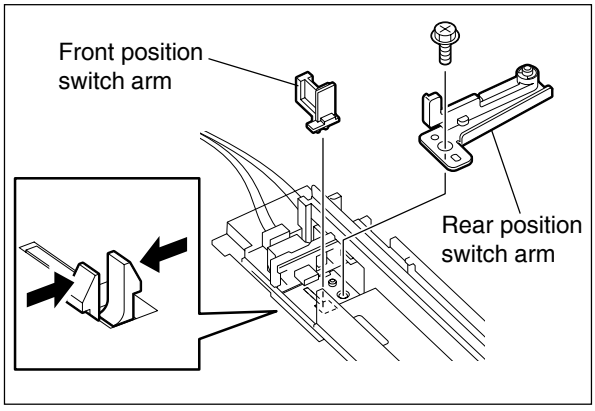


Fig. 11-730

(5) Disconnect 2 connectors and take off the charger cleaner front position detection switch and charger cleaner rear position detection switch.

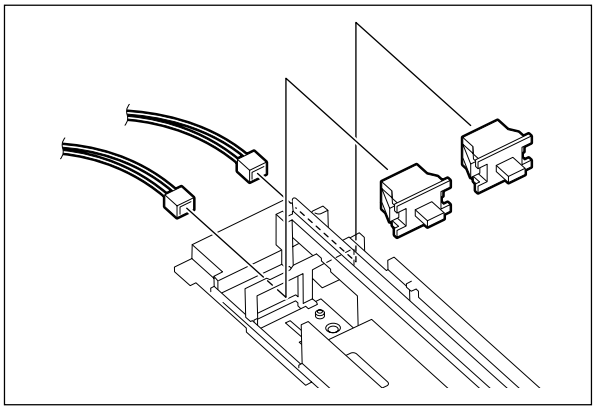


Fig. 11-731

[G] Toner bag full detection sensors

(G-1) Toner bag full detection sensor-1

(1) Take off the developer unit, cleaner unit and transfer belt unit (► Chapters 12.8 [A], 11.7 [A] and 14.7 [A]).
(2) Remove 1 screw and disconnect 1 connector. Take off the toner bag full detection sensor-1 with the whole bracket.

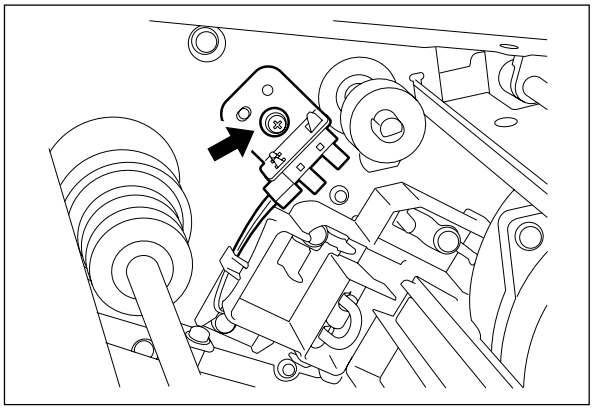


Fig. 11-732

(G-2) Toner bag full detection sensor-2

(1) Open the front cover.
(2) Release 4 latches and take off the toner bag full detection sensor-2.

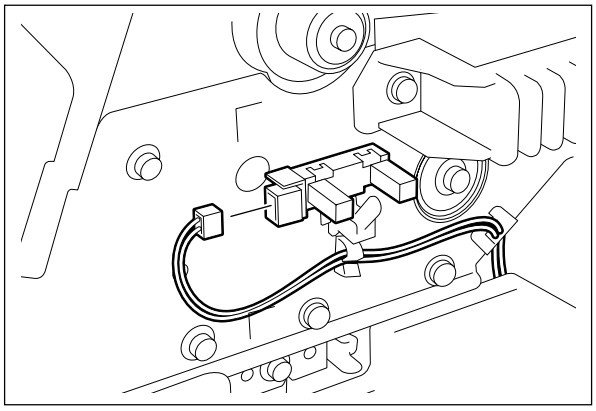


Fig. 11-733

[H] Temperature/Humidity sensor

(1) Take off the front cover, receiving tray and left cover (► Chapter 2.5.1 [A] [B] [F]).

(2) Remove 2 screws and take off the inner cover.

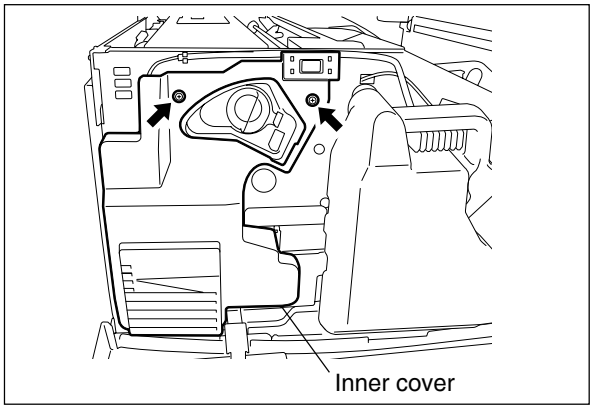


Fig. 11-734

(3) Disconnect 1 connector. Then release 2 latches and take off the temperature/humidity sensor.

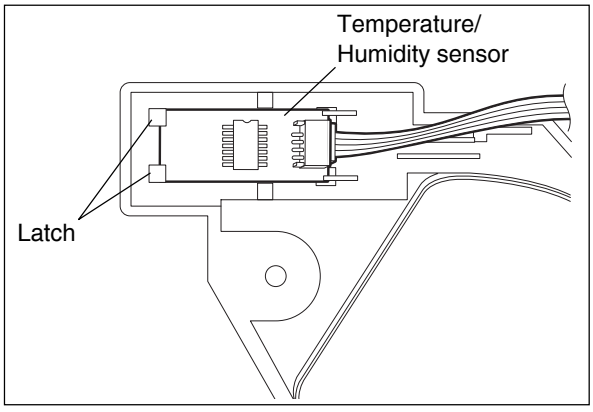


Fig. 11-735

[I] Ozone filter PM

(1) Remove 1 screw and take off the cover.

(2) Pull out the ozone filter.

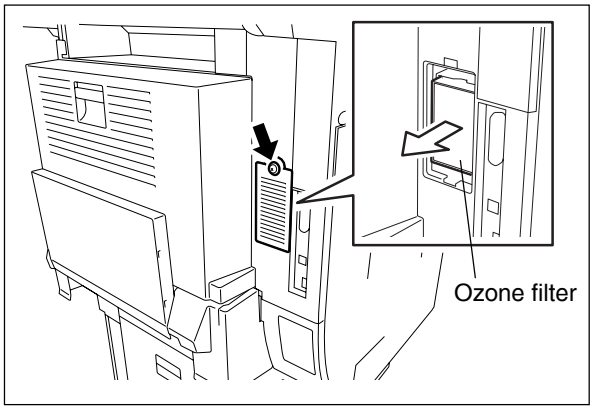


Fig. 11-736

[J] Ozone exhaust fan

(1) Take off the SYS board with the whole case (► Chapter 2.5.2 [C]).

(2) Take off the ozone filter (► Chapter 11.7 [I]).

(3) Disconnect 1 connector and remove 2 screws. Take off the ozone exhaust fan with the whole cover.

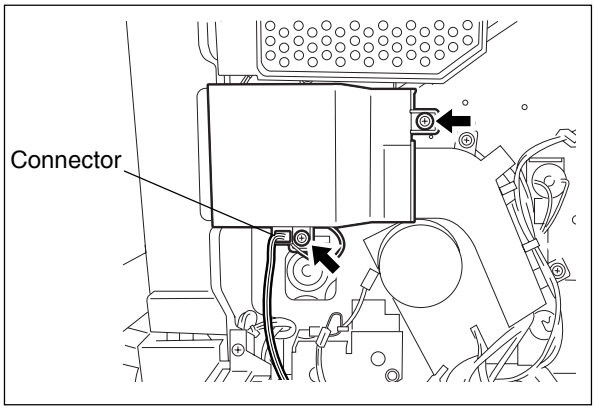


Fig. 11-737

(4) Release 3 latches and take off the cover.
Take off the ozone exhaust fan.

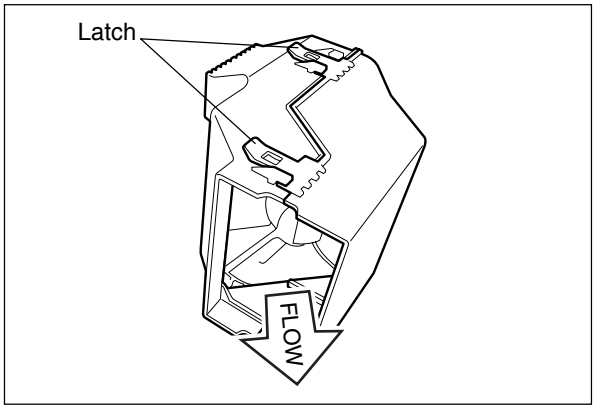


Fig. 11-738

12. DEVELOPER UNIT

12.1 General Description

In this equipment, the three color developers (Y, M and C) are installed in the revolver unit and the black developer is installed independently separated from the revolver unit. This special structure ensures the improved printing productivity at the Black Mode. When developing color images (Y, M or C), the black developer unit escapes contacting with the drum. When developing black images, each color developer unit escapes from the drum by rotating the revolver and the black developer unit contacts with the drum instead.

The developer motor drives the lifting movement and magnet roller rotation of the black developer unit, and also the toner supply and magnet roller rotation of the color developer unit. Chapter 9 in this manual describes more.

12.2 Construction

- Black toner cartridge drive unit
- Developer motor drive unit
  - Black developer unit
    - Developer material
    - Mixer unit
    - Developer sleeve (magnetic roller)
    - Doctor blade
    - Black auto-toner sensor
  - Black developer unit lifting mechanism
  - Color developer unit
    - Developer material
    - Mixer unit
    - Developer sleeve (magnetic roller)
    - Doctor blade
  - Color developer toner supply auger
- Color auto-toner sensor

12.3 Sectional View

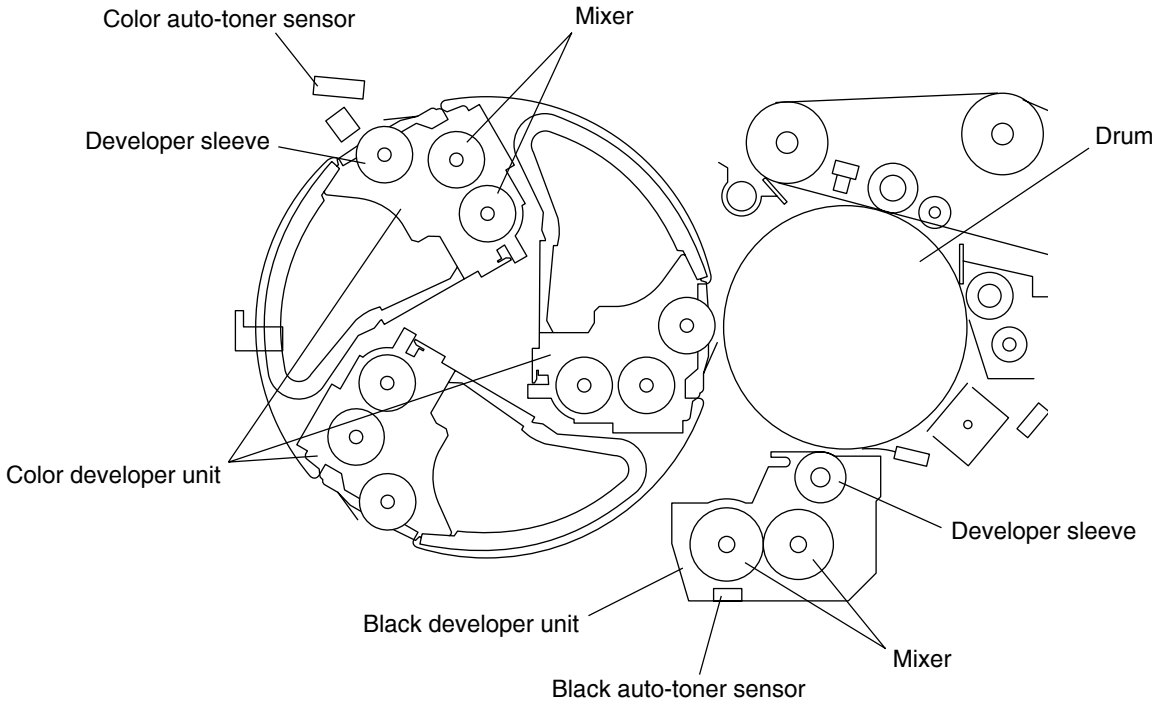


Fig. 12-301

12.4 Black Toner Cartridge Drive Unit

12.4.1 General descriptions

The black toner cartridge is filled with black toner, and supplies the toner to the black developer unit by rotating the toner cartridge with the drive of the toner motor. The black toner cartridge detection switch ensures that the black toner cartridge is in rotation by detecting the protrusion of the toner cartridge. Also, the auto-toner sensor detects whether the toner cartridge is empty by detecting the toner density ratio of the black developer unit.

12.4.2 Toner motor

The toner motor supplies toner to the black developer unit from the toner cartridge. It is driven by the motor driver IC (TA8428K) through an overcurrent protection device. The overcurrent protection device is mounted to protect the toner motor and toner motor driver. When the motor abnormality occurred and the motor drive current exceeding the specified level surged, internal resistance of the overcurrent protection device becomes high to cut off the current.

Its circuit configuration is shown below.

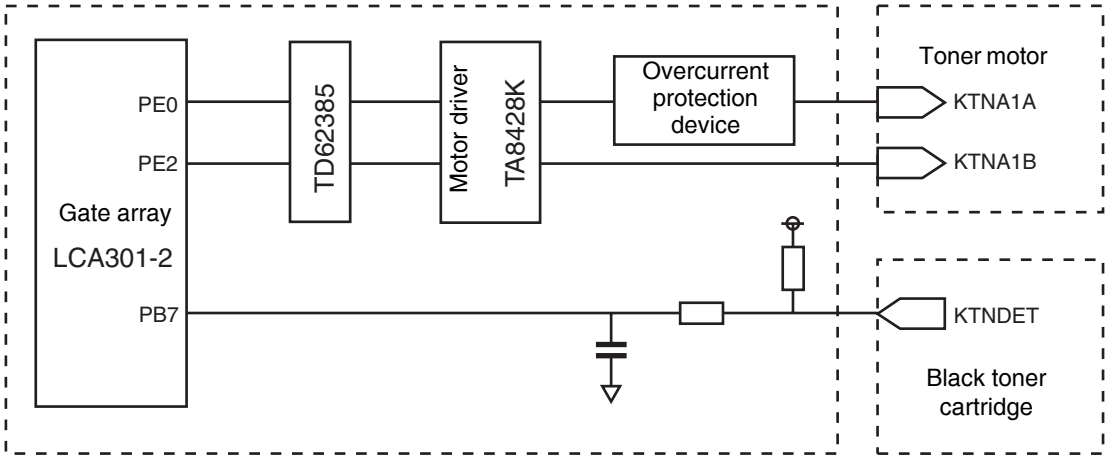


Fig. 12-401

Signal level for motor circuit

	Signal		State
	KTNA1A-0	KTNA1B-0	
Level	L	L	OFF
	L	H	CW (when supplying toner)
	H	L	CCW (detecting cartridge installation)
	H	H	Brake

12.5 Black Developer Unit

12.5.1 Functions

a. Black developer material

The developer material consists of the carrier and toner. The carrier is made of electrically conductive ferrites which is 30-100 µm and the toner is made of the resin particle which is 5-20 µm. Since the developer material deteriorates after a long time use, periodic replacements are needed.

b. Mixer unit

The carrier and toner are frictionized each other when the developer material is stirred. Then the carrier is positively charged (+) and the toner is negatively charged (–), and the toner is adhered by the electrostatic force.

c. Developer sleeve (Magnetic roller)

These aluminum rollers have magnets inside. The developer material is pulled by these magnets to form a magnetic brush. The magnets are fixed at their position so only the sleeve rotates. By this rotation, the developer material is transported to the developer sleeve. Then the magnetic brush formed at the developer sleeve sweeps over the drum surface and thus development is performed.

d. Doctor blade

The doctor blade controls the amount of the developer material from the transport sleeve so that the magnetic brush of the developer material can contact with the drum surface properly.

e. Black auto-toner sensor

To print out a precise image, the proportion (toner density ratio) of the carrier and the toner in the developer material needs to be always constant. The magnetic bridge circuit in the auto-toner sensor detects the toner ratio in the developer material. This sensor supplies the toner from the toner cartridge.

12.5.2 Black developer unit drive section

The black developer motor drives the black developer unit. Connection and disconnection of the developer motor drive is made by ON/OFF of the black developer drive clutch. The drive is connected when it is ON and disconnected when it is OFF.

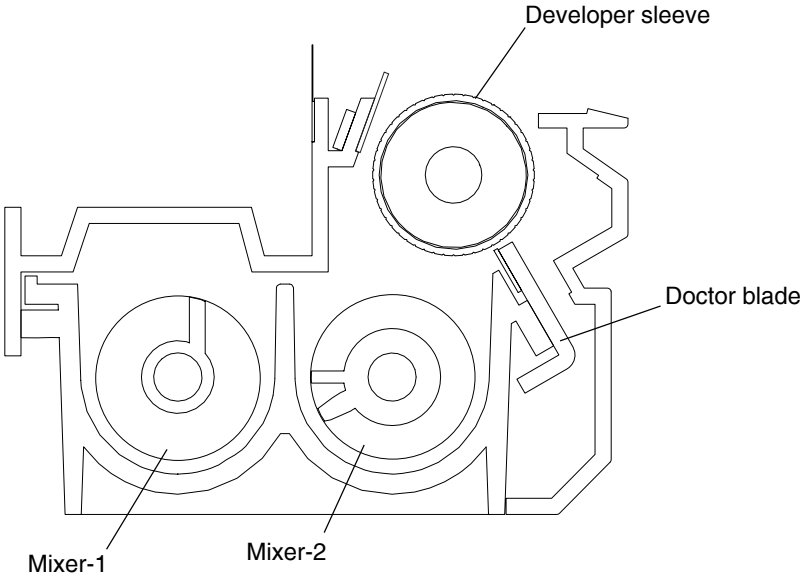


Fig. 12-501

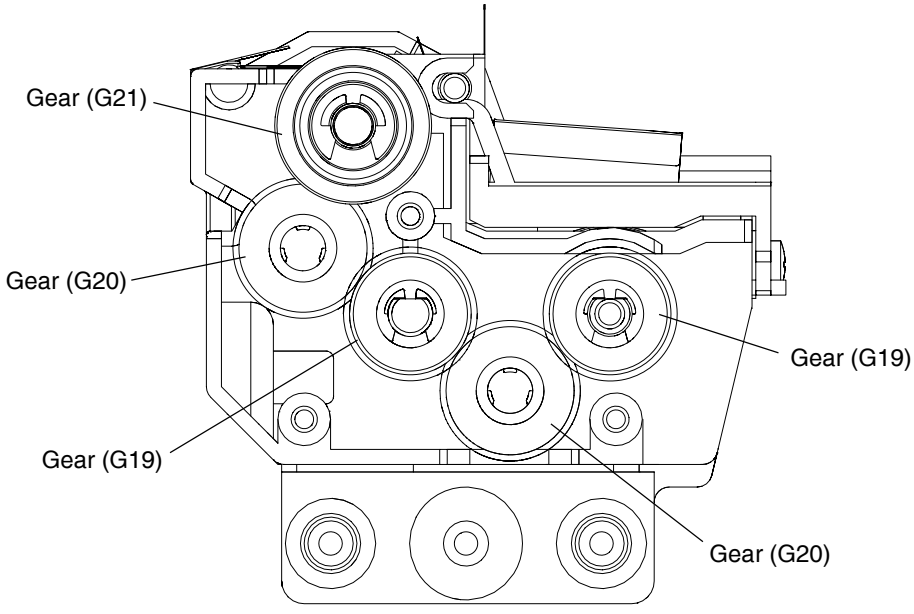


Fig. 12-502

12.5.3 Black auto-toner sensor circuit

(1) Functions of auto-toner circuit

- Detection of the toner density in the developer material
  - density lowered → toner supplied
- Detection of the toner being empty in the toner cartridge

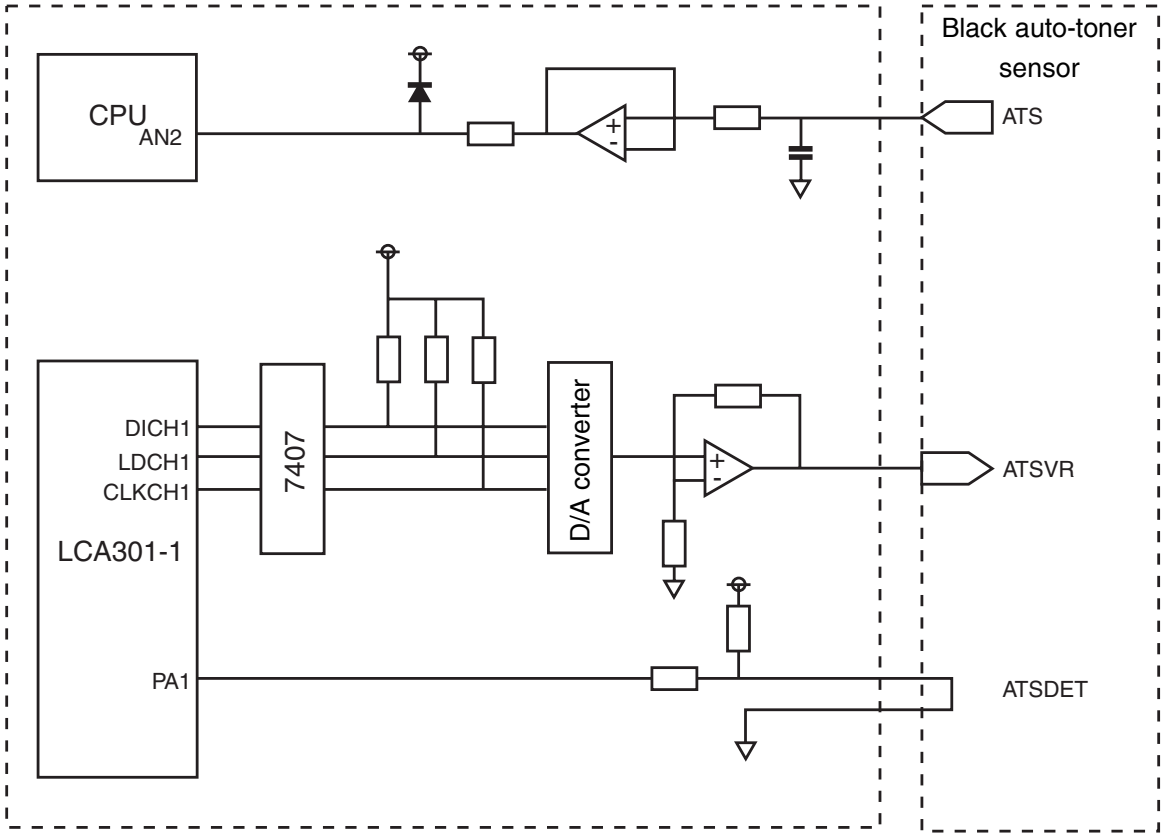


Fig. 12-503

(2) Functions of the black auto-toner sensor

a. Initializing function: When unpacking and replacing the developer material

The automatic adjustment is made so that the output of the auto-toner sensor (input value of the main CPU) will be 2.45V to 2.55V for the toner density of new developer material.

b. Toner density stabilizing function: During the printing operation

Through the following phases, the toner density is kept constant.

Toner is consumed.
→ Toner density decreases.
→ Output change of the auto-toner sensor is detected depending on the humidity.
→ Drives toner motor.
→ Supplies toner to the developer unit from the toner cartridge.

c. Toner-empty detection/clear function:

Detects toner being empty in the toner cartridge.

Drives toner motor.
→ Output of the auto-toner sensor is not changed.
→ Toner density is not changed.
→ Detects toner being empty.

Toner-empty clear

Drives toner motor.
→ Supplies toner from the toner cartridge.
→ Output of the auto-toner sensor changes.
→ Toner density recovers to its normal value.
→ "Toner-empty" is cleared.

(3) Operations of black auto-toner sensor

The black auto-toner sensor is composed of the following circuits.

Drive winding	: Magnetic head (primary side) with a high-frequency magnetic field, which forms a magnetic circuit in the developer material
Detection winding	: Receiving the changes in the magnetic resistance of the developer material via a magnetic circuit (secondary side)
DC conversion circuit	: Converting the high-frequency output from the detection winding to a DC signal

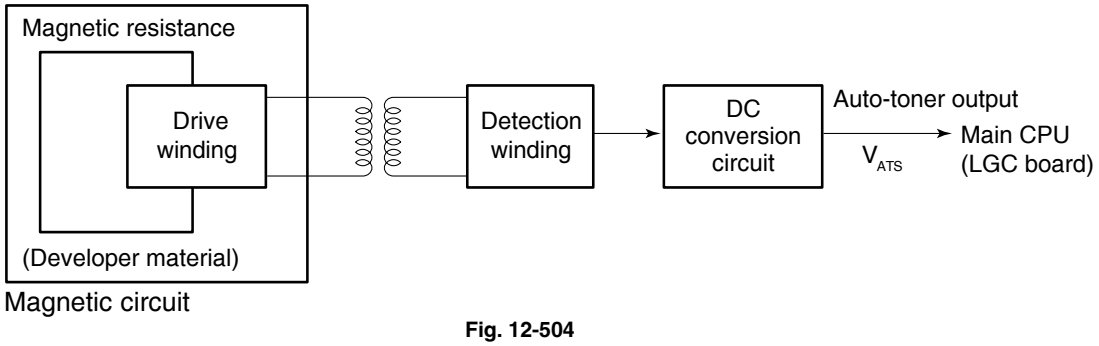


Fig. 12-504

When the toner density is low:

Toner ratio to the carrier in the developer material decreases.
→ Magnetic resistance decreases.
→ Detection output increases.
→ Auto-toner output V_{ATS} increases.

When the toner density is high:

Toner ratio to the carrier in the developer material increases.
→ Magnetic resistance increases.
→ Detection output decreases.
→ Auto-toner output V_{ATS} decreases.

12.5.4 Black developer unit lifting mechanism

(1) General descriptions

In the black developer unit, the drive from the developer motor is transmitted to cam with the black developer lifting clutch and this promotes the lifting movement of the black developer unit to contact or release against the photoconductive drum. When developing color images, (Y, M or C), the black developer unit escapes contact with the drum. When developing black images each color developer unit releases from the drum by rotating its revolver and the black developer unit contacts with the drum instead.

Black developer contact position detection sensor detects whether the black developer unit is at the developing position or at the escape position.

(2) Construction

- Black developer lifting clutch

  An electromagnetic clutch contacts or releases the black developer unit against the drum.
  The clutch movement lifts the developer unit up and down by rotating the cam.

- Black developer contact position detection sensor

  Detects whether the black developer unit is at the contact position or release position. This sensor detects the shield plate. “L” is output when contacting and “H” is output when releasing.

- Black developer contact timing detection sensor

  Controls the black developer lifting clutch. This sensor outputs reference timing signals for controlling ON/OFF of the black developer lifting clutch. “H” is output when releasing and “L” is output when contacting. The sensor controls the power supply to turn OFF the clutch after detecting the output alteration (“L” to “H” or “H” to “L”).

12.6 Color Developer Unit

12.6.1 Functions

a. Color developer material

The developer material consists of the carrier and toner. The carrier is made of electrically conductive ferrites which is 30-100 µm and the toner is made of the resin particle which is 5-20 µm. Since the developer material deteriorates after a long time use, periodic replacements are needed.

b. Mixer unit

The carrier and toner are frictionized each other when the developer material is stirred. Then the carrier is positively charged (+) and the toner is negatively charged (–), and the toner is adhered by the electrostatic force.

c. Developer sleeve (Magnetic roller)

These aluminum rollers have magnets inside. The developer material is pulled by these magnets to form a magnetic brush. The magnets are fixed at their position so only the sleeve rotates. By this rotation, the developer material is transported to the developer sleeve. Then the magnetic brush formed at the developer sleeve sweeps over the drum surface and thus development is performed.

d. Doctor blade

The doctor blade controls the amount of the developer material from the transport sleeve so that the magnetic brush of the developer material can contact with the drum surface properly.

12.6.2 Color developer unit drive section

The color developer motor drives the color developer unit. Connection and disconnection of the developer motor drive is made by ON/OFF of the color developer drive clutch. The drive is connected when it is ON and disconnected when it is OFF. The transmitted drive operates the mixers.

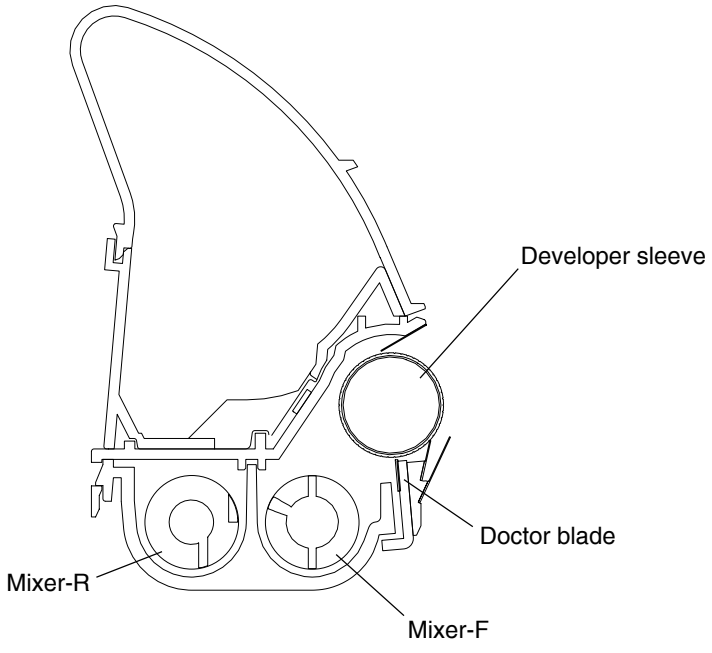


Fig. 12-601

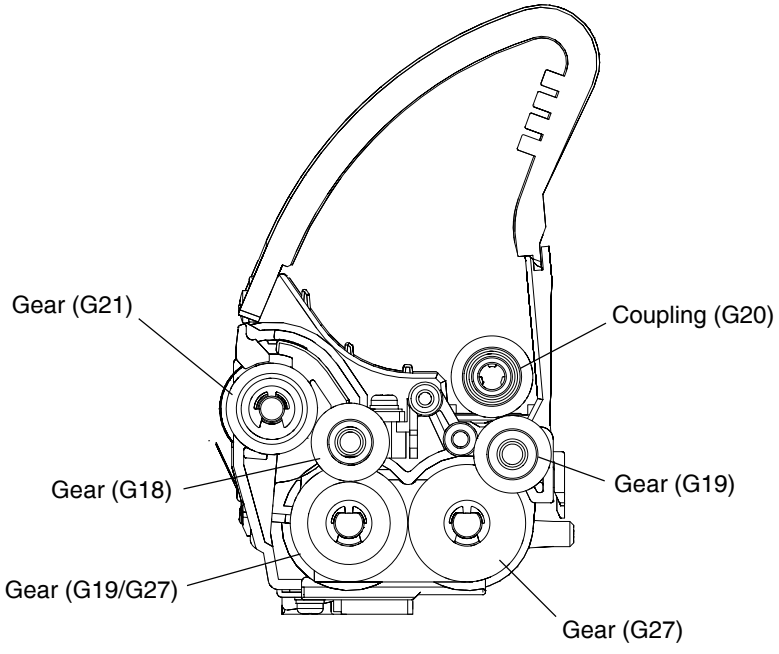


Fig. 12-602

12.6.3 Color auto-toner sensor circuit

(1) General descriptions

The color auto-toner sensor detects the toner amount on the color developer sleeve with the reflection-type photosensor, differing from the black auto-toner sensor. Light-receiving elements of diffuse reflection in this sensor detect the toner amount on the sleeves with the light amount reflected from the sleeve surface. It detects the toner amount at the first forward position from the developing position.

When the toner runs out, it supplies the toner from the toner cartridge with the color toner supply auger driven by the color developer toner supply clutch.

Also, the color auto-toner sensor has a shutter which opens and closes by the solenoid. It prevents stain to the sensor and calibrates the sensor with the reflection from the shutter.

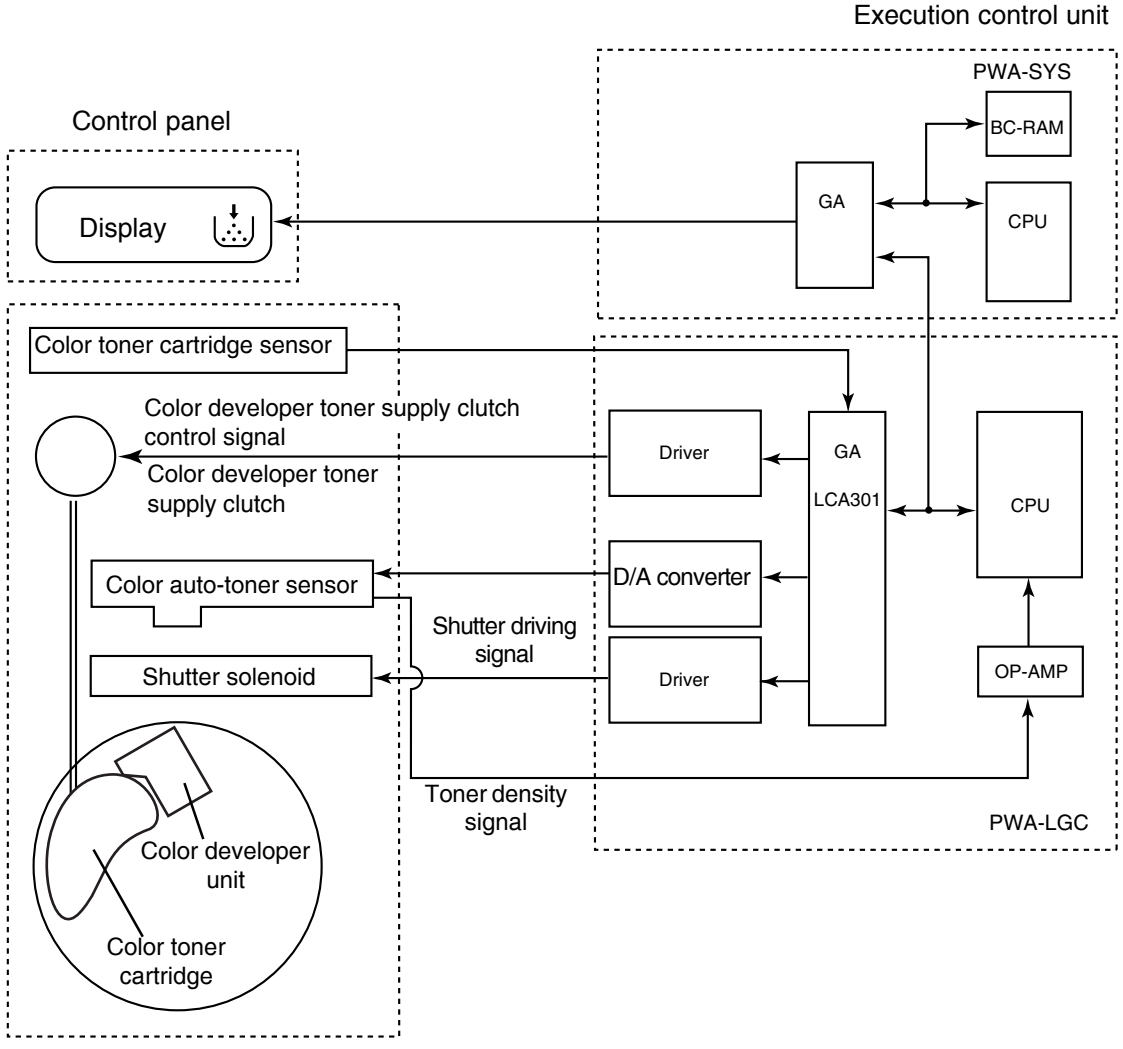


Fig. 12-603

(2) Functions of the color auto-toner sensor

a. Initializing function: When unpacking or replacing developer material

This sensor automatically adjusts the light amount of sensor to make the detected value of toner density of new developer material by auto-toner sensor equal to the fixed value. Also, the detected value by the reference plate is stored in memory after this adjustment.

b. Toner density stabilizing function:

The difference between the toner density on the sleeve and the toner density at the initialization mentioned above is detected. Then the difference is adjusted to maintain the density at a certain level.

The detected value of auto-toner sensor is corrected in comparison with the detected value by the reference plate not to be affected with temperature, stain and deterioration.

Through the following phases, the toner density is kept constant.

Toner is consumed.

→ Toner density decreases.

→ Output change of the auto-toner sensor is detected at the preceding position to the developing position.

→ Drives the developer motor at the developing position.

→ Drives the color developer toner supply clutch.

→ Supplies the toner for a specified period of time.

→ The same procedure is repeated for other two colors.

c. Toner-empty detection/clear function:

Detects toner being empty in the toner cartridge.

Drives toner motor.

→ Output of the auto-toner sensor is not changed.

→ Toner density is not changed.

→ Detects toner being empty (Toner-empty detection function).

Clears toner-empty.

Drives toner motor.

→ Supplies toner from the toner cartridge.

→ Output of the auto-toner sensor is changed.

→ Toner density recovers to its normal value.

→ “Toner-empty” is cleared. (Toner-empty clear function)

(3) Operations of the color auto-toner sensor

When the toner density is low:

Toner ratio to the carrier in the developer material decreases.

→ The light reflection amount decreases.

→ Detection output (voltage) decreases.

When the toner density is high:

Toner ratio to the carrier in the developer material increases.

→ The light reflection amount increases.

→ Detection output (voltage) increases.

12.6.4 Color toner supply

1. The color developer unit whose toner needs to be supplied moves to the developing position.
2. The developer unit is driven and the toner is supplied for a regulated period of time.
3. The drive is stopped and the unit moves to the color toner density detection position to detect the density.
4. When the toner density detected is higher than the regulated value, it moves to the escape position. When the toner density detected is lower than the regulated value, it repeats the procedure 1 to 3 for five times. If the toner density is still lower than the regulated value, it is judged as “toner empty” and the unit moves to the escape position.
5. Procedure 1 to 4 is repeated for other color developer units when the toner supply is needed.

12.7 High-Voltage Transformer Output Control Circuit

Developer bias is supplied from high-voltage power supply to the developer sleeve and the toner image on the developer sleeve is transferred onto the photoconductive drum.

A color developer bias and a black developer bias are output separately.

Each developer bias consists of DC and AC which has an independent ON/OFF control. At DC, D/A converter adjusts the level of output value in both color and black modes since each mode has a different control condition.

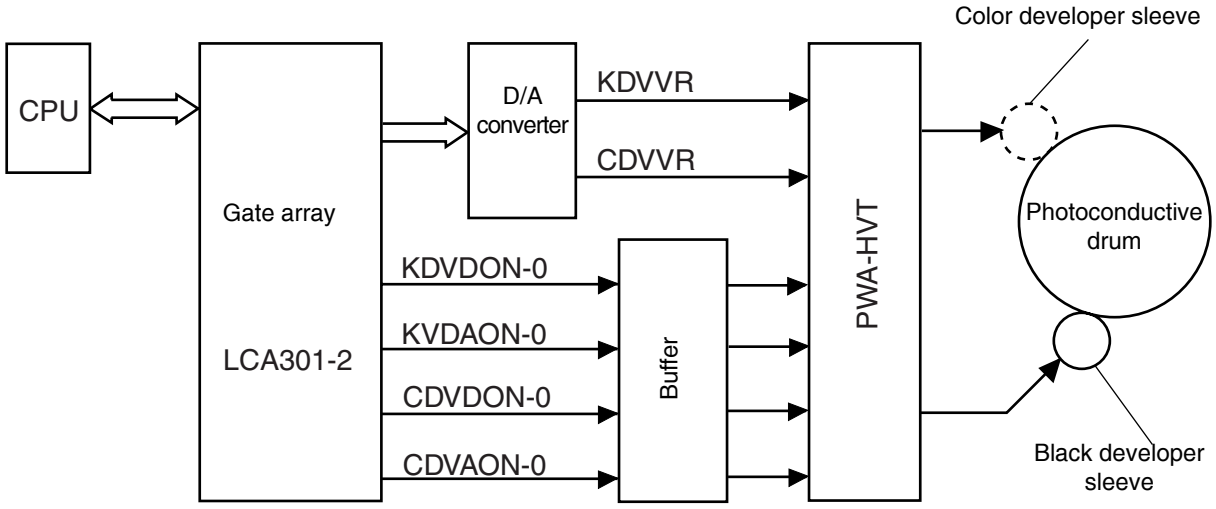


Fig. 12-701

- Outputs adjustment value of the developer bias (DC) in the NVRAM to the main processor.

↓

- Outputs control voltage data from the main CPU to the D/A converter.

↓

- Analog conversion by the D/A converter.

↓

- Outputs control voltage Vc to the developer bias transformer.

↓

- The developer bias transformer generates output voltage proportional to the control voltage Vc by ON-signed.

  * Adjustment of the control voltage Vc (change of adjustment data) is performed in the adjustment mode.

12.8 Disassembly and Replacement

[A] Black developer unit

(A-1) Black developer unit

(1) Open the front cover and take out the toner bag (► Chapter 2.5.1 [A]).

(2) Turn the black developer unit lifting lever to the position where a clock hand could be at 9 o'clock. Remove 2 screws and take off the black developer unit cover.

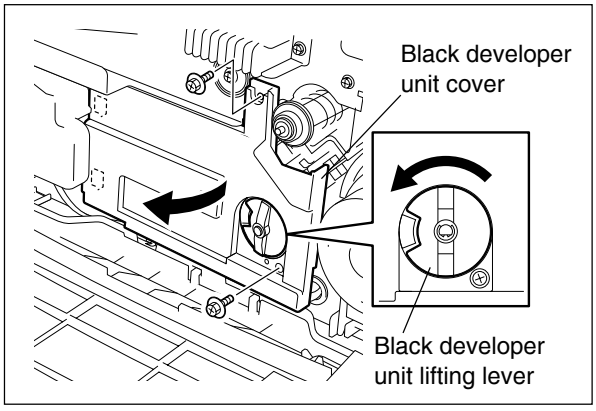


Fig. 12-801

(3) Disconnect 2 connectors and remove 1 screw. Pull out the black developer unit.

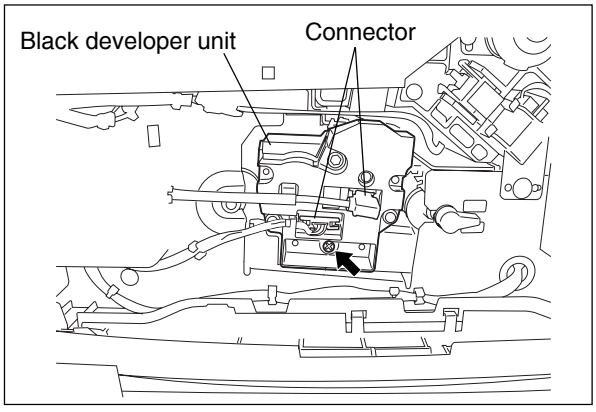


Fig. 12-802

(A-2) Developer material

(1) Take off the black developer unit (► Chapter 12.8 (A-1)).

(2) Remove 2 screws and take off the upper cover.

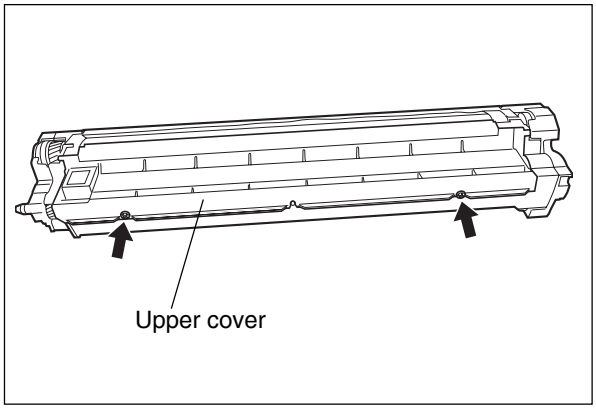


Fig. 12-803

(3) Discharge the developer material.

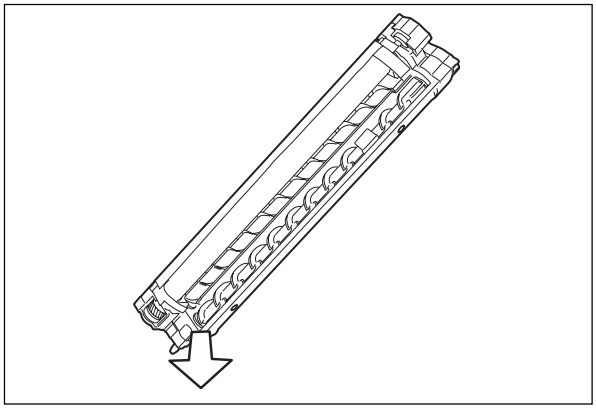


Fig. 12-804

(4) Pour the developer material.

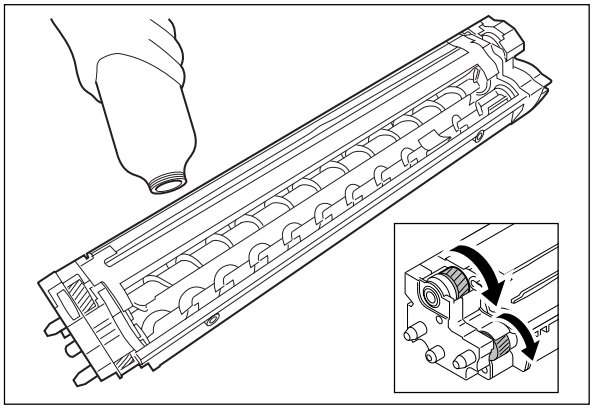


Fig. 12-805

Note: When installing the upper cover, make sure the urethan seal is covered by the upper cover.

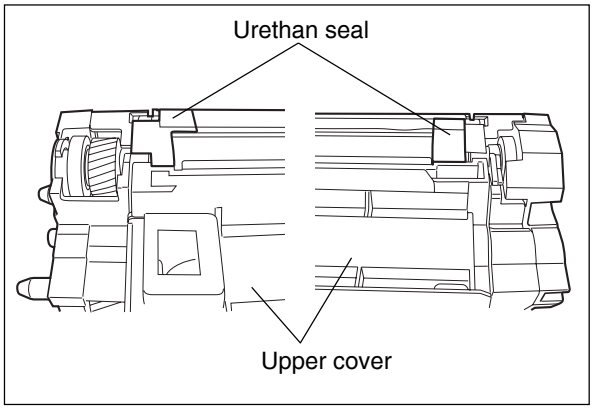


Fig. 12-806

(A-3) Auto-toner sensor

(1) Discharge the developer material (► Chapter 12.8 (A-2)).

(2) Disconnect 1 connector, remove 1 screw and take off the auto-toner sensor.

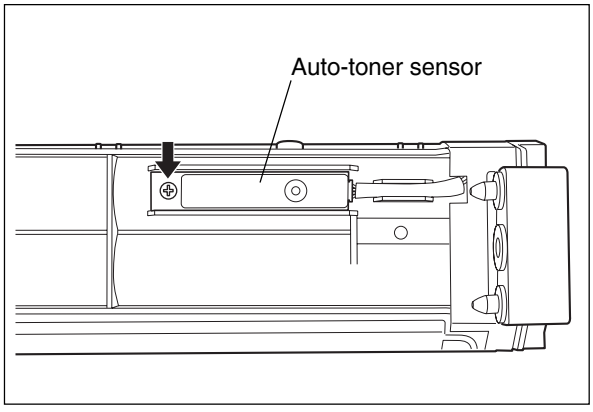


Fig. 12-807

(A-4) Doctor blade

(1) Discharge the developer material (► Chapter 12.8 (A-2)).

(2) Remove 2 screws and take off the right cover.

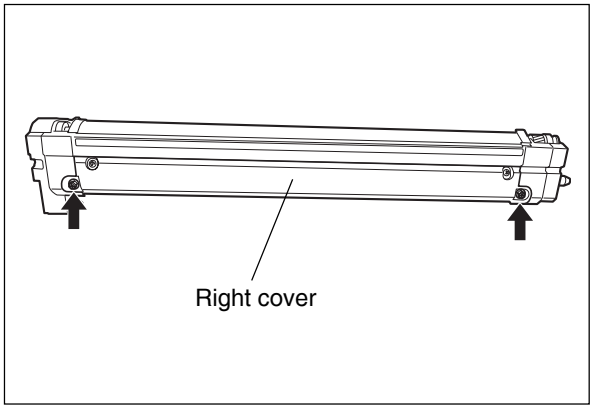


Fig. 12-808

(3) Remove 2 screws and take off the doctor blade.

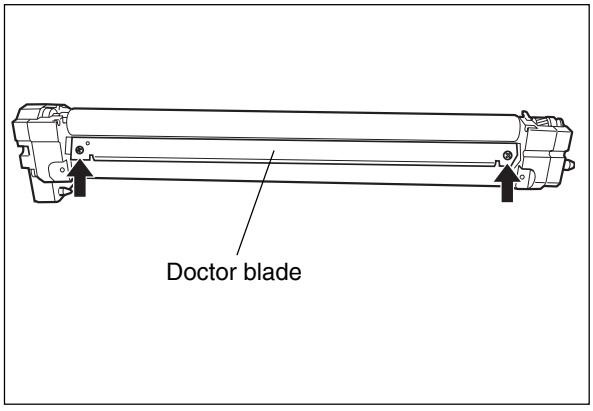


Fig. 12-809

(A-5) Developer sleeve

(1) Discharge the developer material (► Chapter 12.8 (A-2)).

(2) Take off the right cover (► Chapter 12.8 (A-4)).

(3) Remove 3 screws. Disconnect 1 connector and take off the front cover.

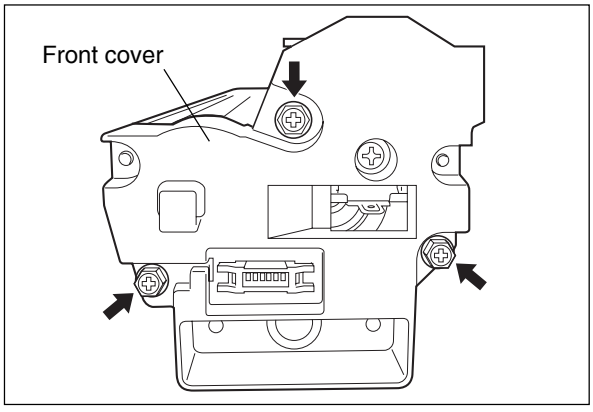


Fig. 12-810

(4) Remove 1 screw and take off the polarity adjustment plate.

Note: Before disassembling, record (mark if any) the scale pointed by the polarity adjustment lever. Then match the polarity adjustment plate at the scale previously recorded when reassembling.

(5) Remove 1 screw and take off the bracket.

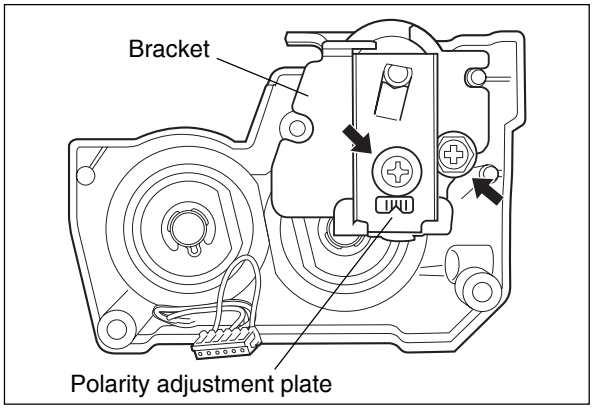


Fig. 12-811

(6) Remove 3 screws and take off the rear cover.

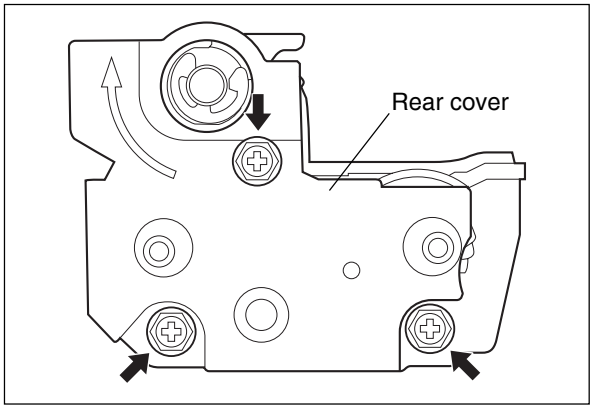


Fig. 12-812

(7) Front side: Remove the following parts installed on the shaft of the developer sleeve in order: Bushing, collar, roller, bearing-1, E-ring, bearing-2 and oil seal.
* Procedure for replacing an oil seal:
► Page 12-23

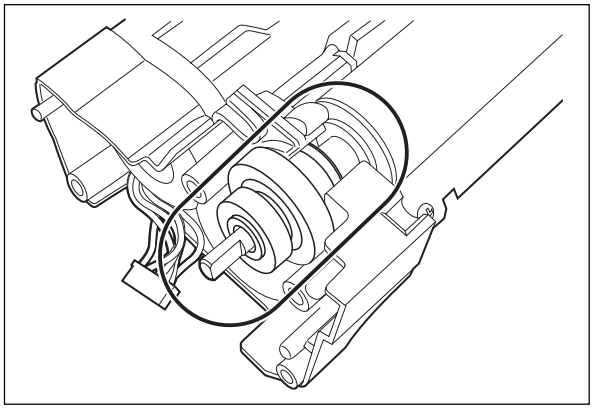


Fig. 12-813

(8) Rear side: Remove the following parts installed on the shaft of the developer sleeve in order: E-ring, bushing, collar, roller, bearing-1, E-ring, gear, pin, bearing-2 and oil seal.
(9) Take off the developer sleeve.
* Procedure for replacing an oil seal:
► Page 12-23

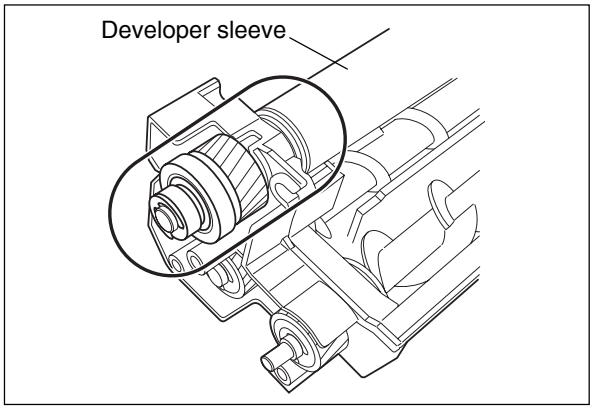


Fig. 12-814

(A-6) Mixer

(1) Discharge the developer material (► Chapter 12.8 (A-2)).
(2) Take off the developer sleeve (► Chapter 12.8 (A-5)).
(3) Front side: Remove the following parts installed on the shaft of each mixer in order: E-ring, bushing-1 and bushing-2.
* Procedure for replacing an oil seal:
► Page 12-23
(4) Rear side: Remove the following parts installed on the shaft of each mixer in order: E-ring, gear, bearing and oil seal.
* Procedure for replacing an oil seal:
► Page 12-23

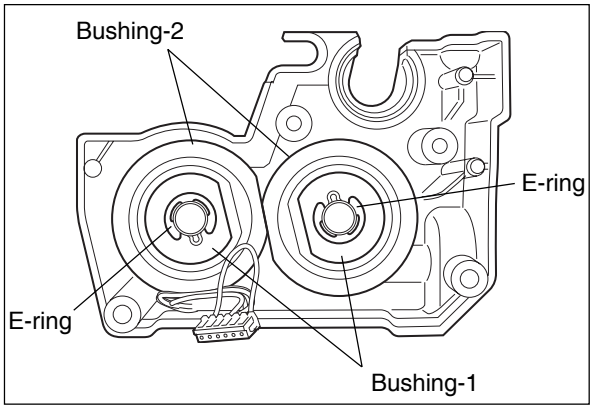


Fig. 12-815

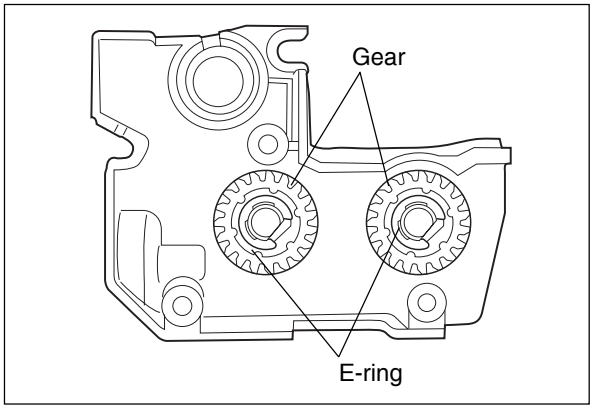


Fig. 12-816

(5) Take off the mixer from the hole of front side.

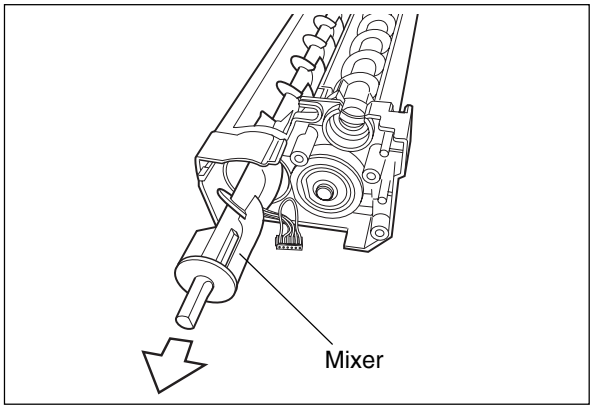


Fig. 12-817

[B] Color developer unit

(B-1) Developer material

(1) Remove 2 screws, release 5 hooks and take off the toner holder by rotating it.

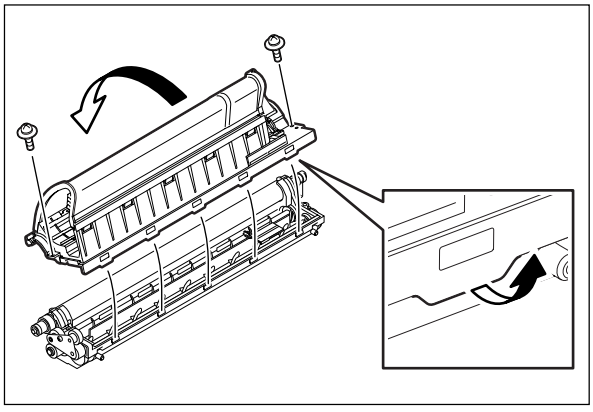


Fig. 12-818

Notes:

1. Do not try to release the hooks forcibly.

2. When installing the toner holder, rotate the holder with hooking the magnet roller side of it.

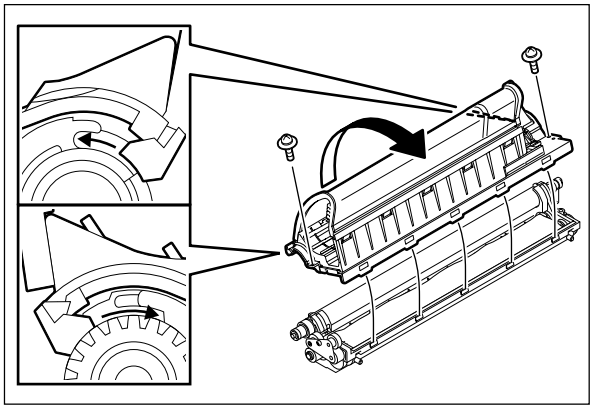


Fig. 12-819

3. When installing the toner holder, be careful not to peel the seal.

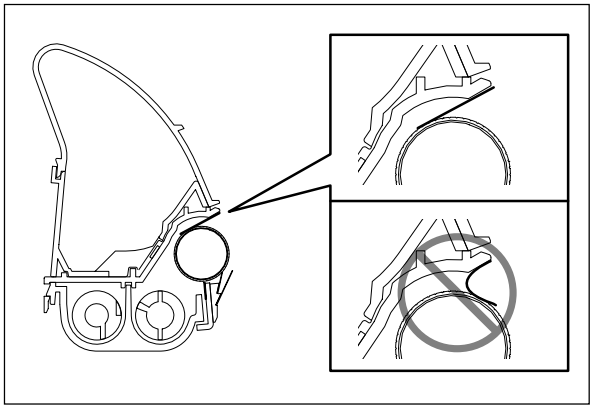


Fig. 12-820

(2) Discharge the developer material.

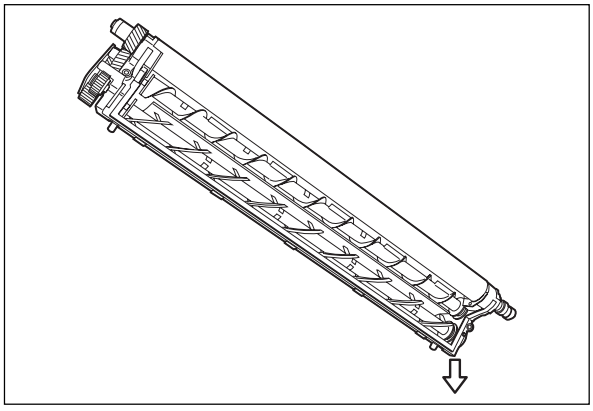


Fig. 12-821

(3) Pour the developer material.

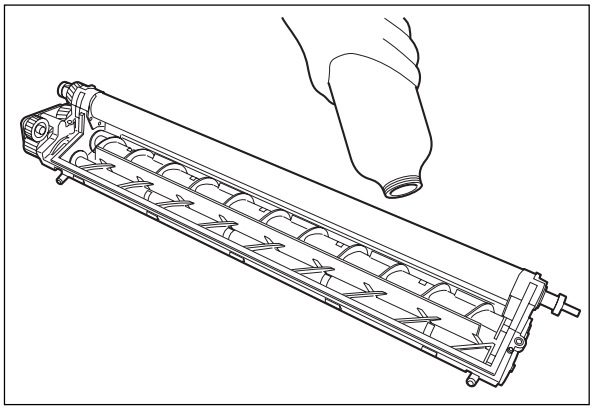


Fig. 12-822

(B-2) Doctor blade

(1) Discharge the developer material (► Chapter 12.8 (B-1)).
(2) Remove the urethan seal.
(3) Remove 2 screws and take off the doctor blade.

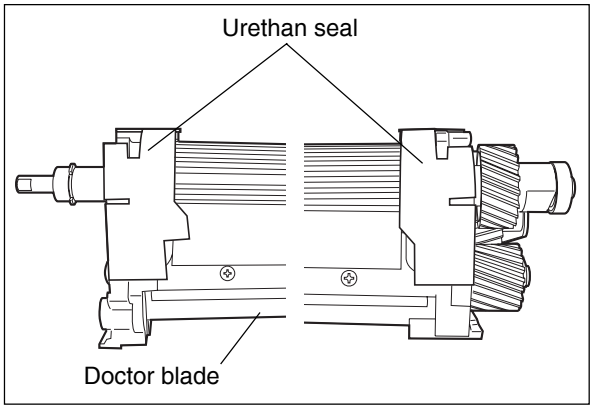


Fig. 12-823

(B-3) Developer sleeve

(1) Discharge the developer material (► Chapter 12.8 (B-1)).
(2) Remove the urethan seal (► Chapter 12.8 (B-2)).
(3) Front side: Remove 1 screw and take off the polarity adjustment plate.

Note: Before disassembling, record (mark if any) the scale pointed by the polarity adjustment lever. Then match the polarity adjustment plate at the scale previously recorded when reassembling.

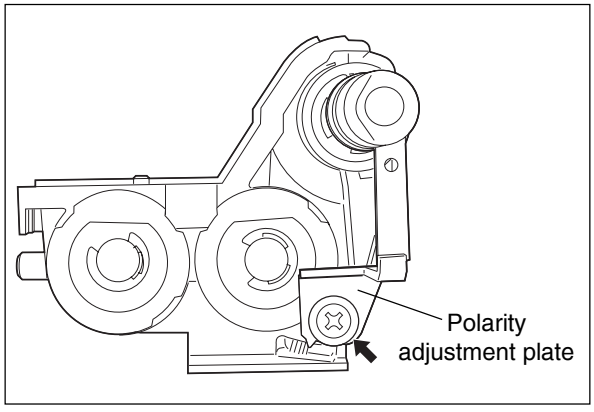


Fig. 12-824

(4) Remove the following parts installed on the shaft of the developer sleeve in order: C-ring, bearing-1, C-ring, E-ring, bearing-2 and oil seal.
* Procedure for replacing an oil seal:
► Page 12-23

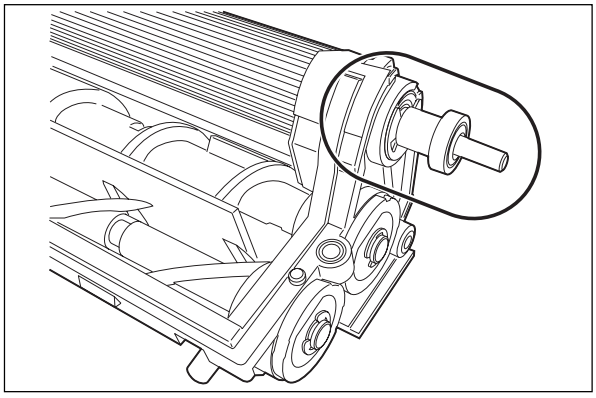


Fig. 12-825

(5) Rear side: Remove 1 screw and take off the gear assembly.

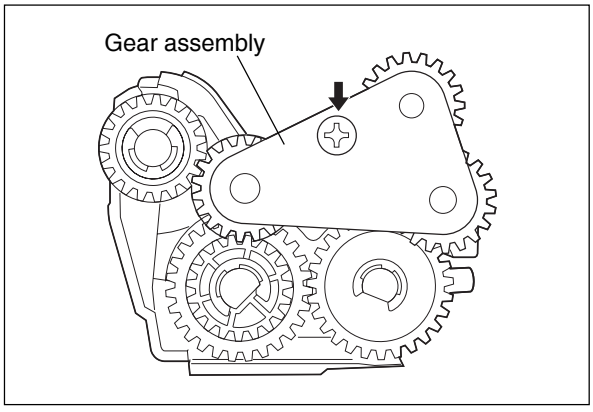


Fig. 12-826

(6) Remove the following parts installed on the shaft of the developer sleeve in order: E-ring, bearing, gear, bearing and oil seal.
(7) Take off the developer sleeve.
* Procedure for replacing an oil seal:
► Page 12-23

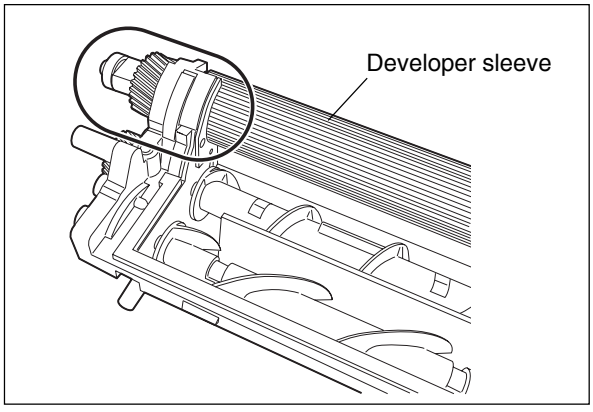


Fig. 12-827

(B-4) Mixer

(1) Discharge the developer material (► Chapter 12.8 (B-1)).
(2) Take off the developer sleeve (► Chapter 12.8 (B-3)).
(3) Front side: Remove the following parts in order: E-ring, bushing-1 and bushing-2.
* Procedure for replacing an oil seal:
► Page 12-23

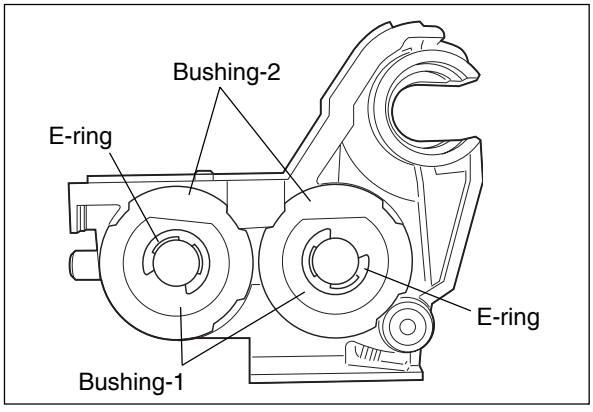


Fig. 12-828

(4) Rear side: Remove the following parts in order: E-ring, gear, bearing or bushing, and oil seal.
* Procedure for replacing an oil seal:
► Page 12-23

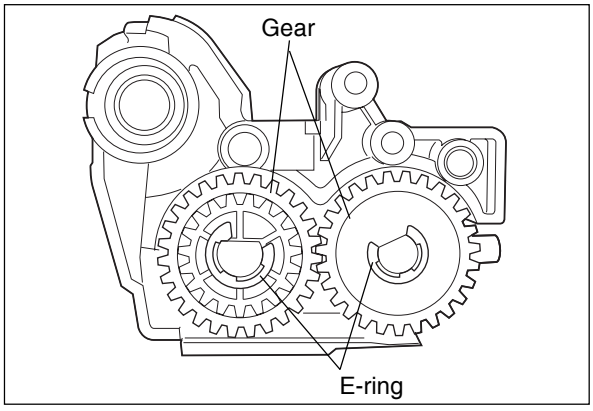


Fig. 12-829

(5) Take off the mixer from the hole of front side.

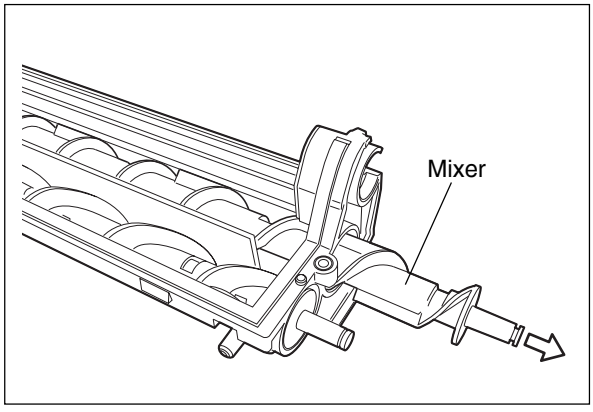


Fig. 12-830

<<Procedure for replacing an oil seal>>

1. Take off the oil seal by hooking out its inside with a fine screwdriver and such.
2. Push in a new oil seal parallel to the frame, bushing and so on with paying attention to its direction (as shown by the figure at right).
3. Spread the grease (Alvania No.2; about 2-rice-grain's amount) all around the inside diameter.

Note: Wipe off the grease which has run off to the inner side of the oil seal.

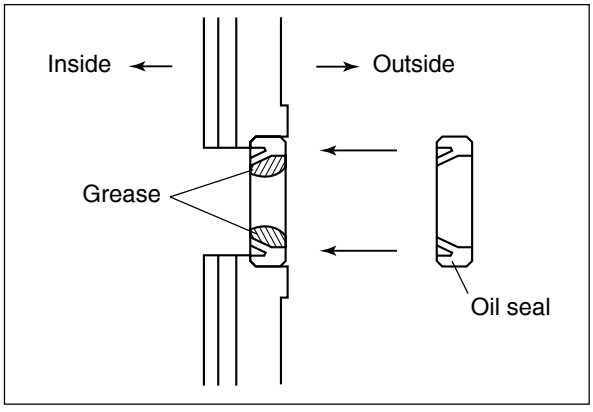


Fig. 12-831

[C] Black developer lifting unit

(1) Take off the black developer toner supply unit (► Chapter 11.7 [K]).

(2) Remove the harnesses from 5 harness clamps. Disconnect 3 connectors and remove 2 screws and 2 springs. Take off the black developer lifting unit.

Note: The springs on both front and rear sides differ in the active coils (length of spring). When installing, pay attention to its active coils (length of spring).

Front side: 20 (longer)

Rear side: 18 (shorter)

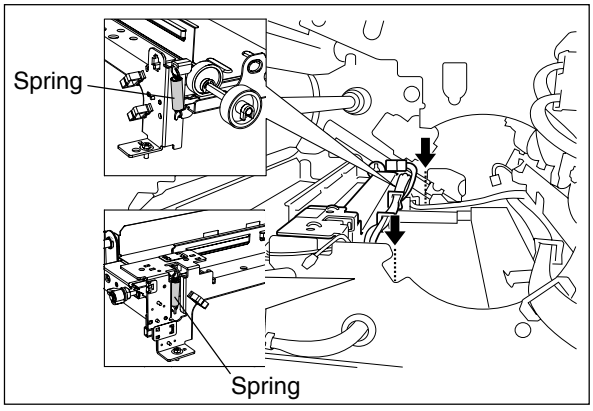


Fig. 12-832

(3) Disconnect 1 connector and release the latches. Then take off the black developer contact timing detection sensor.

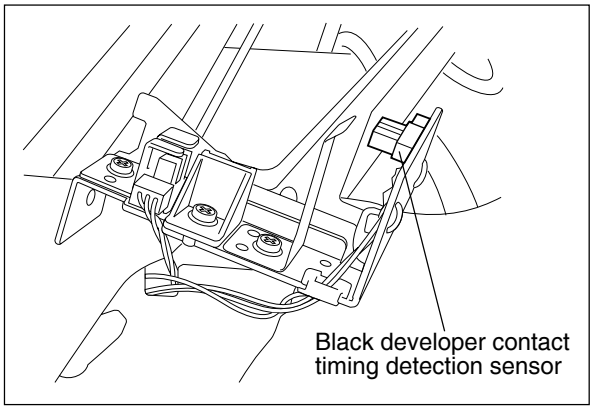


Fig. 12-833

(4) Remove 1 screw and disconnect 1 connector. Then take off the black developer contact position detection sensor with the whole bracket.

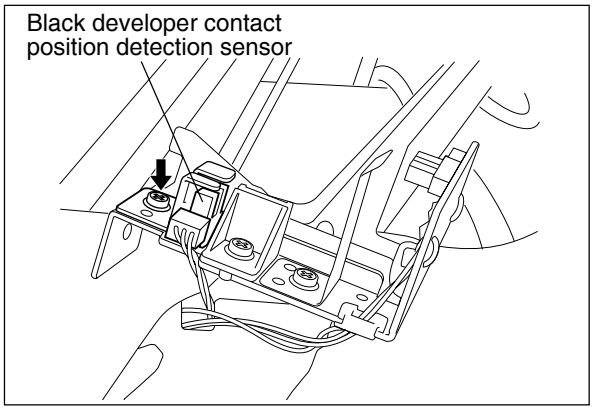


Fig. 12-834

[D] Black toner supply unit

(1) Take off the laser optical unit (► Chapter 8.6 [A]).
(2) Take off the transfer belt unit (► Chapter 14.7 [A]).
(3) Take off the front cover (► Chapter 2.5.1 [A]).
(4) Take off the toner bag (► Chapter 2.5.1 [A]).
(5) Take off the black developer unit (► Chapter 12.8 [A]).
(6) Take off the cleaner unit (► Chapter 11.7 [A]).
(7) Take off the discharge LED unit (► Chapter 11.7 [F]).
(8) Take off the front lower cover (► Chapter 2.5.1 [D]).
(9) Take off the front right cover (► Chapter 2.5.1 [E]).
(10) Remove 2 screws and take off the bracket of the front cover opening/closing switch. (It is not necessary to disconnect the connectors.)
(11) Remove 1 screw and 1 clip, take off the transfer belt contact lever. And then, take off the shaft.
(12) Remove 2 screws and take off the cleaner rail stay.

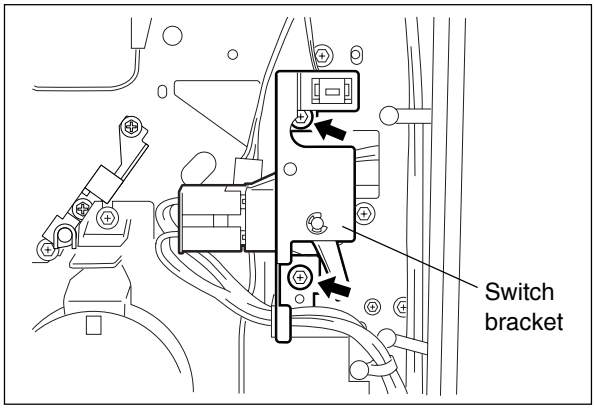


Fig. 18-835

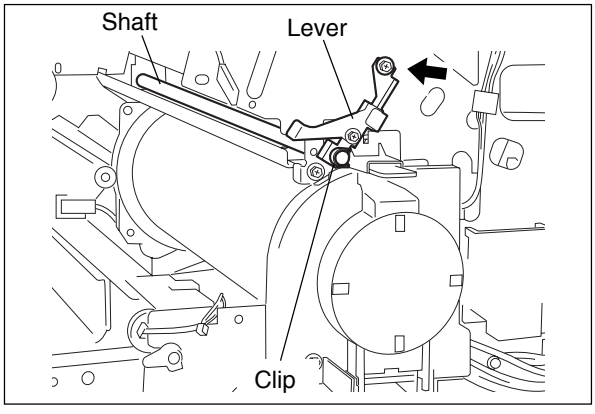


Fig. 12-836

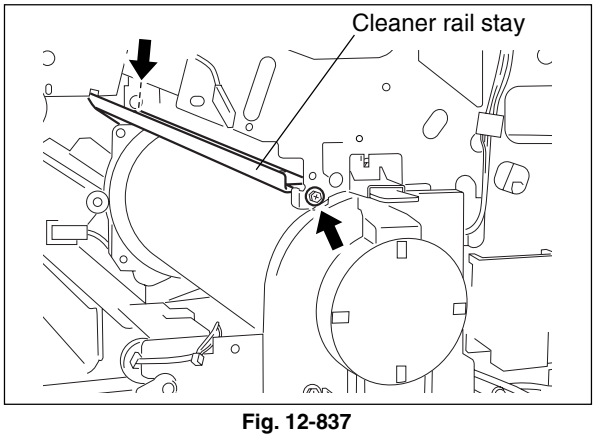


Fig. 12-837

(13) Take off the black toner cartridge.

(14) Remove 2 screws, release the harness from the hook and pull out the toner case by rotating it a little.

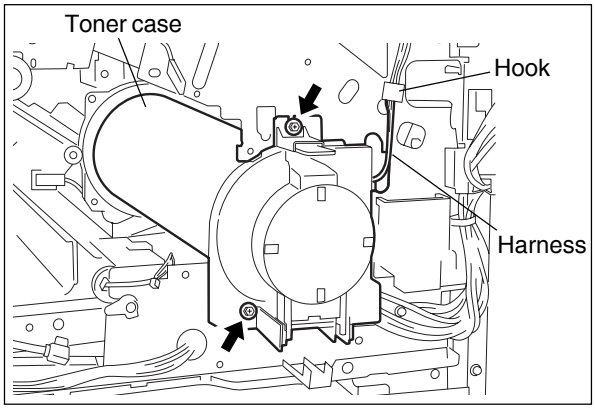


Fig. 12-838

(15) Remove 2 screws.

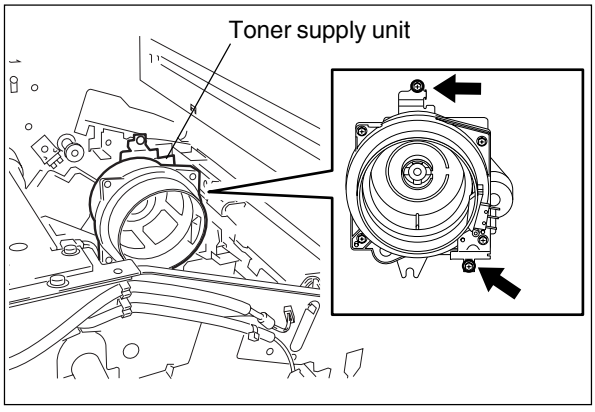


Fig. 12-839

(16) Disconnect 2 connectors and take off the toner supply unit by lifting up and pulling out toward you to release it from the catch.

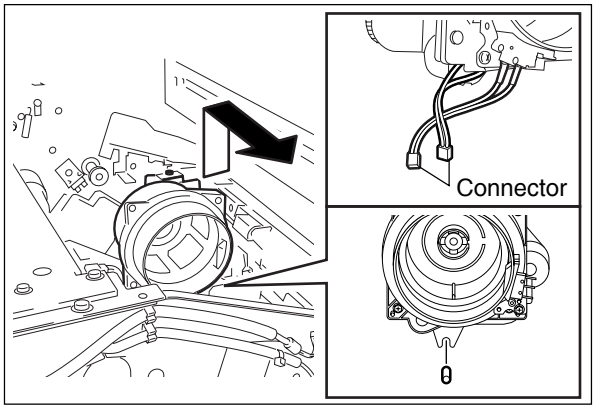


Fig. 12-840

(17) Remove 1 screw and disconnect 1 connector from the bracket. Then take off the black toner cartridge switch with the whole bracket.

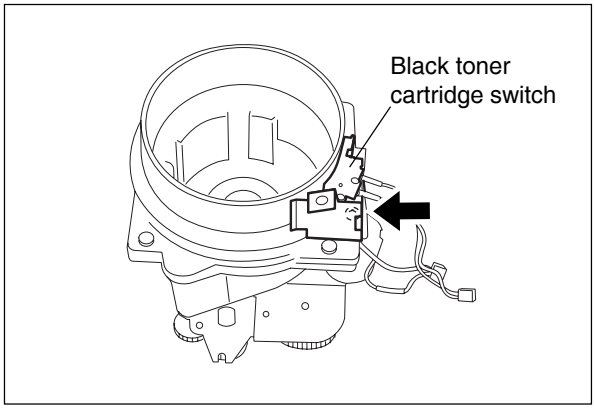


Fig. 12-841

(18) Remove 2 screws and take off the toner motor.

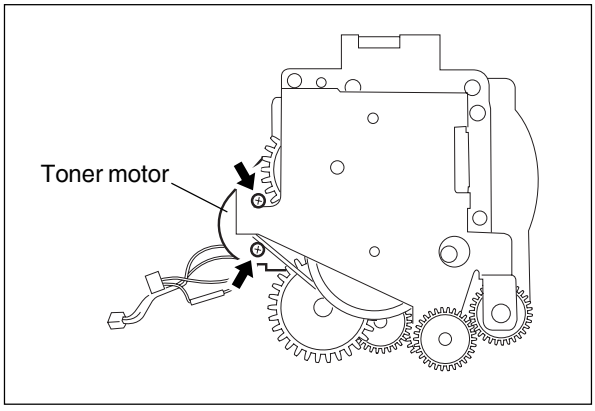


Fig. 12-842

[E] Black toner supply auger unit

(1) Take off the black toner supply unit (► Chapter 11.7 [K]).

(2) Take off the black developer lifting unit (► Chapter 12.8 [C]).

(3) Remove 1 screw and take off the cleaner rail stay.

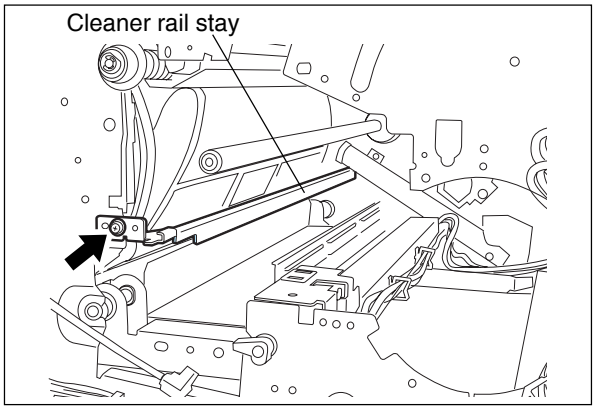


Fig. 12-843

(4) Remove 2 screws and take off the black toner supply auger unit.

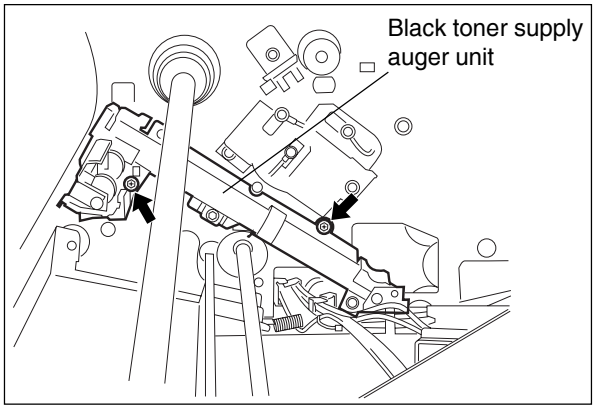


Fig. 12-844

13. REVOLVER UNIT

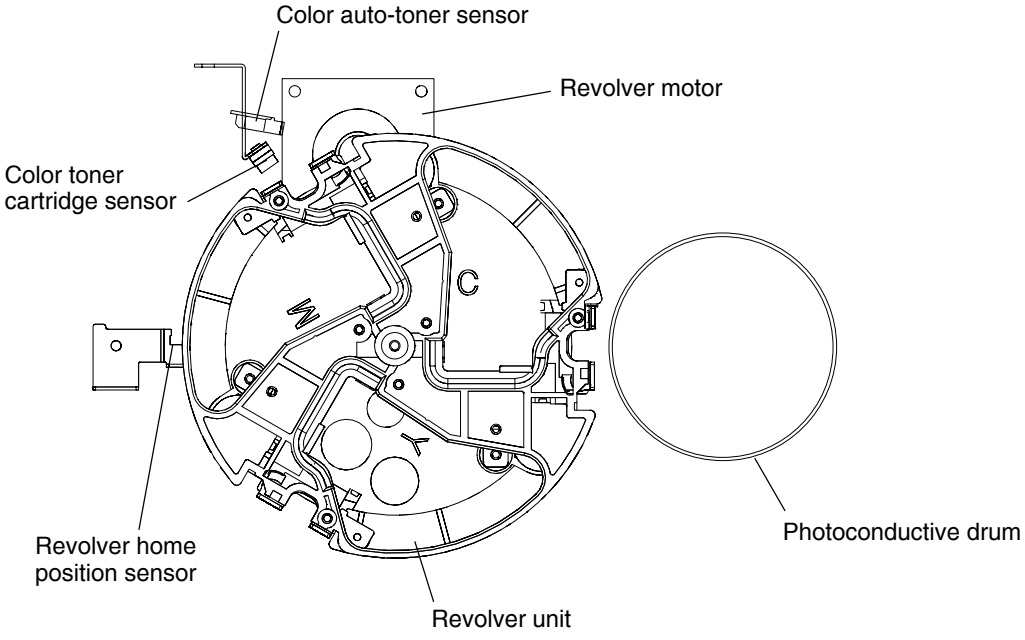
13.1 General Description

The revolver unit has three colors (yellow, magenta and cyan) of developer units and three colors of toner cartridges inside. The revolver rotates 120 degrees in a clockwise direction to move each color developer unit to the developing position, and thus color development is performed. At black development, the revolver rotates to move them to the escape position not to contact with the photoconductive drum.

13.2 Construction

This chapter explains about the following units, parts and control circuits related to the revolver unit. Refer to Chapter 12 for the color developer unit and Chapter 9 for the developer motor drive unit.

- Revolver motor
- Developer motor drive unit
- Color toner
- Color developer unit
- Color toner cartridge sensor
- Color auto-toner sensor



[Revolver unit sectional view]

Fig. 13-201

13.3 Functions

(1) Revolver motor

The revolver unit rotates with the drive of the revolver motor (two-phase stepping motor). The revolver home position sensor detects its home position.

(2) Developer motor drive unit

The developer motor drives the color developer unit and the toner supply auger in the revolver unit. This drive is connected and disconnected by the color developer unit drive clutch and the color toner supply clutch. Only the color developer unit at the developing position is driven by this motor.

(3) Color toner cartridge

The color toner cartridge and the color developer units are fitting each other to prevent misinstallation of the color toner cartridge. Therefore, the revolver unit has no device preventing misinstallation.

(4) Color developer unit

The color developer units must be in the revolver unit to perform color development. Since the revolver unit has no device to detect misinstallation, be careful not to install the wrong unit. Refer to Chapter 12 for details.

(5) Color toner cartridge sensor

This sensor detects the installation fault of the color toner cartridge. It is an optical reflection sensor detecting the installation fault with the reflecting light from the reflection section. The color toner cartridge is detected at the toner cartridge replacement position.

(6) Revolver home position sensor

This sensor is a transmissive type light sensor detecting the revolver unit home position. The position detection is performed at initialization. "Call for service" if it does not detect the position in a specified period of time.

13.4 Drive of Revolver Unit

The drive from the revolver motor is transmitted to the gear at the external layer of the revolver unit rear side. Then the revolver unit rotates clockwise.

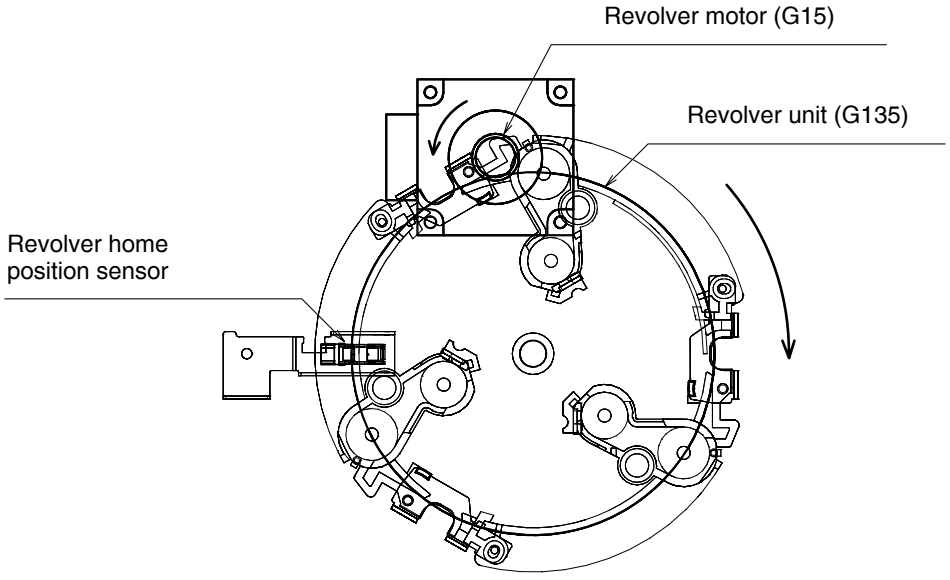


Fig. 13-401

13.5 Revolver Motor Drive Circuit

13.5.1 Revolver motor

The revolver motor (two-phase stepping motor) drives over the DRV board circuit.

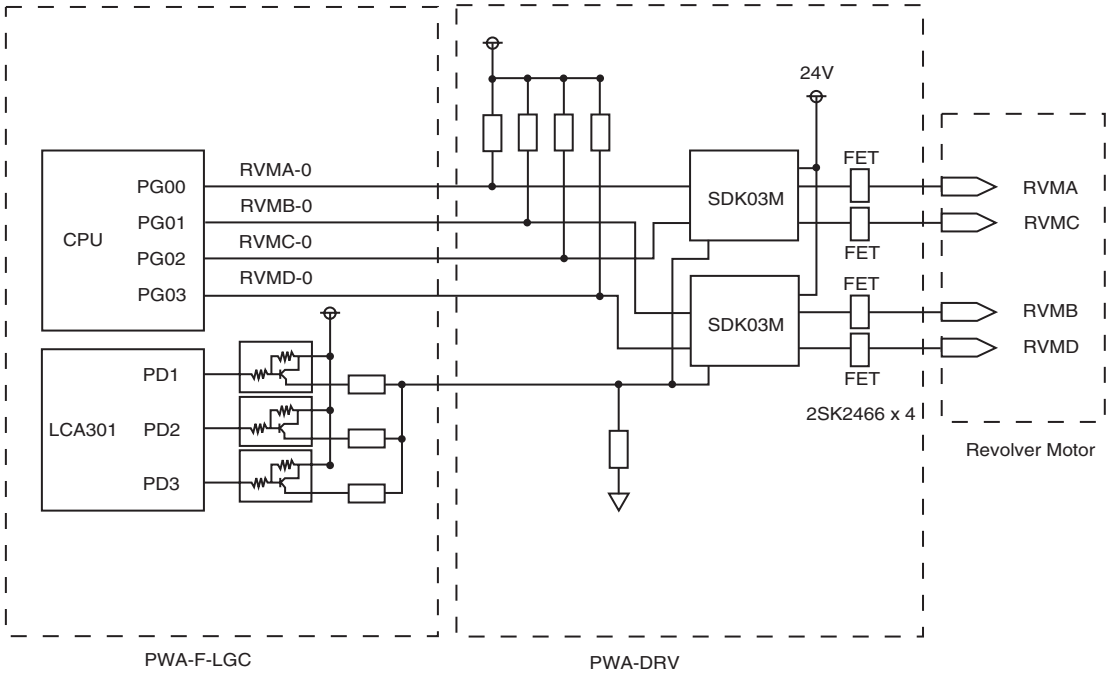


Fig. 13-501

13.6 Operation

13.6.1 Home position detection

The revolver unit detects its home position at every warming-up after the power is turned ON or the front cover is opened/closed since this unit is driven by the stepping motor. The home position is the point where the revolver home position sensor detects the shielded part in the revolver unit.

13.6.2 Escape position movement

The color developer units (C, M and Y) are escaped from the developing position when developing black image by rotating the revolver unit. This escaping movement is performed after every home position detection. The escape position is where these color developer units are during warming-up. The movement always starts from the escape position when printing starts.

13.6.3 During warming-up

The home position detection and escape position movement are performed consecutively during warming-up. Then the revolver unit operations such as toner supply and image quality control are performed according to the conditions of the equipment.

13.6.4 During printing

The revolver unit moves in order, as follows:
Escape position (black image development) → Cyan image developing position → Magenta image developing position → Yellow image developing position → Escape position (printing completed)
In addition to the basic movement mentioned above, the revolver operations such as toner supply and image quality control are performed according to the conditions of the equipment.

1. Image quality control is performed immediately before the printing operation according to the conditions of the equipment.
2. The revolver unit stays at the escape position to perform the black image development.
3. The revolver unit moves to the cyan image developing position after the completion of black image development.
4. The cyan developer unit is driven and performs developing. At the same time, the density of magenta toner is detected and the detection result is stored in memory.
5. The revolver unit moves to the magenta image developing position after the completion of cyan image development.
6. The magenta developer unit is driven and performs developing. At the same time, the density of yellow toner is detected and the detection result is stored in memory.
7. The revolver unit moves to the yellow developing position after the completion of magenta image development.
8. The yellow developer unit is driven and performs developing. At the same time, the density of cyan toner is detected and the detection result is stored in memory.
9. The revolver unit moves to the escape position to perform black image development after the completion of yellow image development.
10. If any of color toner is judged as the low density, the revolver unit supplies the toner.
11. Procedure 2 to 10 is repeated when printing more than 1 page.
12. Printing finishes. Image quality control is performed according to the conditions of the equipment.

13.6.5 Color toner supply

1. The color developer unit whose toner needs to be supplied moves to the developing position.
2. The developer unit is driven and the toner is supplied for a regulated period of time.
3. The drive is stopped and the unit moves to the color toner density detection position to detect the density.
4. When the toner density detected is higher than the regulated value, it moves to the escape position. When the toner density detected is lower than the regulated value, it repeats the procedure 1 to 3 for five times. If the toner density is still lower than the regulated value, it is judged as “toner empty” and the unit moves to the escape position.
5. Procedure 1 to 4 is repeated for other color developer units when the toner supply is needed.

13.6.6 During image quality control

1. A black test pattern is formed on the transfer belt while the revolver unit is at the escape position.
2. The revolver unit moves to the cyan developing position after the completion of the black image development and a cyan test pattern is formed.
3. It moves to the magenta developing position after the completion of the cyan image development and a magenta test pattern is formed.
4. It moves to the yellow developing position after the completion of the magenta image development and a yellow test pattern is formed.
5. It moves to the escape position after completion of the yellow image development.
6. The image quality sensor reads the image density of four colors and feedbacks to the image quality control.
7. Procedure 1 to 7 is repeated for one to six times until the specified gradation characteristic and image density are obtained.

13.7 Disassembly and Replacement

[A] Color toner cartridge

(1) Rotate the revolver to the toner cartridge replacement position.

Note: Perform the Test Mode (03) on the control panel.
Yellow toner cartridge moves to the replacement position: 03-452
Magenta toner cartridge moves to the replacement position: 03-453
Cyan toner cartridge moves to the replacement position: 03-454

(2) Open the front cover. Take off the color toner cartridge while pressing the knob.

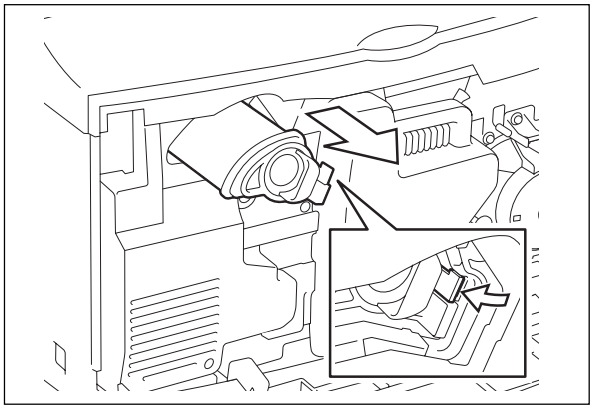


Fig. 13-701

[B] Color developer unit

(1) Take off the color toner cartridge (► Chapter 13.7 [A]).
(2) Take off the left cover (► Chapter 2.5.1 [F]).
(3) Rotate the revolver to the color developer replacement position.
a. When rotate the revolver manually,
a-1. Lift up the revolver lock lever.
a-2. Rotate the revolver in the direction of white arrow until it is locked.

Note: Do not touch the sleeve with bare hands.

b. When rotate the revolver automatically,
Start up the Test Mode (03) and use the following codes.
Yellow developer unit moves to the replacement position: 03-455
Magenta developer unit moves to the replacement position: 03-456
Cyan developer unit moves to the replacement position: 03-457

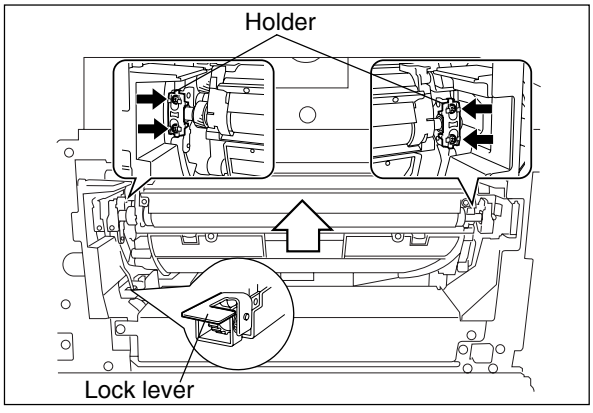


Fig. 13-702

(4) Loosen 2 screws on each holder and take off 2 holders.
(5) Pull out and take off the color developer unit. If the other color developer units still need to be replaced, repeat the procedure (3) to (5). When rotate the revolver unit manually, push down the revolver lock lever and rotate it a little in the direction of white arrow, and then follow the procedure “a”.

Note: When installing the color developer unit, pay attention to the direction of the holder.

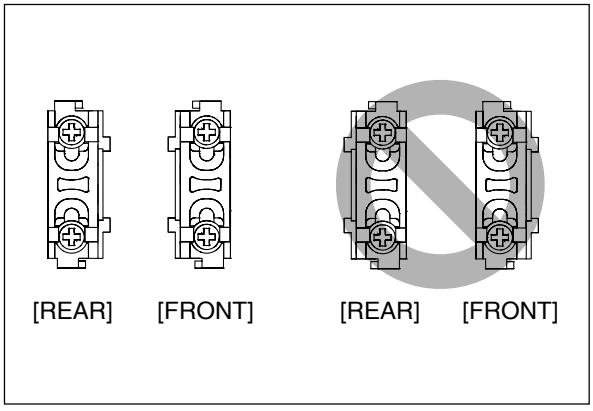


Fig. 13-703

[C] Revolver motor

(1) Take off the rear cover (► Chapter 2.5.1 [P]).
(2) Take off the LGC board with the whole case (► Chapter 2.5.2 [A]).
(3) Disconnect 1 connector and remove 4 screws and take off the revolver motor with the whole bracket.

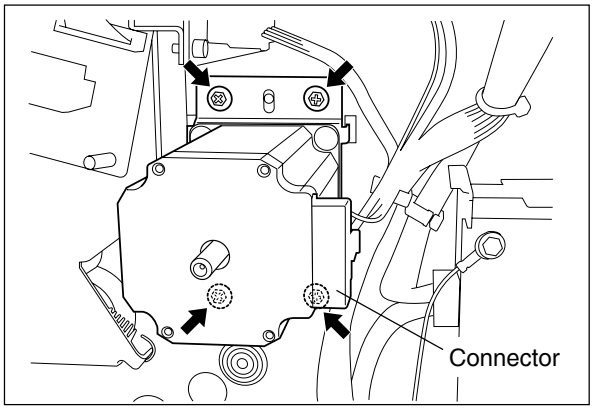


Fig. 13-704

[D] Color toner cartridge sensor

(1) Take off the receiving tray (► Chapter 2.5.1 [B]).
(2) Disconnect 1 connector and remove 1 screw and take off the color toner cartridge sensor with the whole bracket.

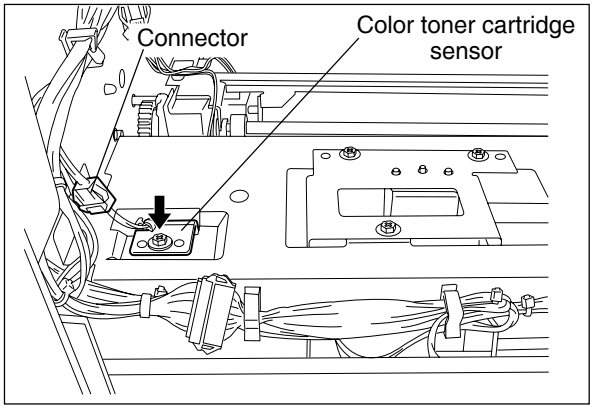


Fig. 13-705

(3) Remove 1 screw and take off the color toner cartridge sensor.

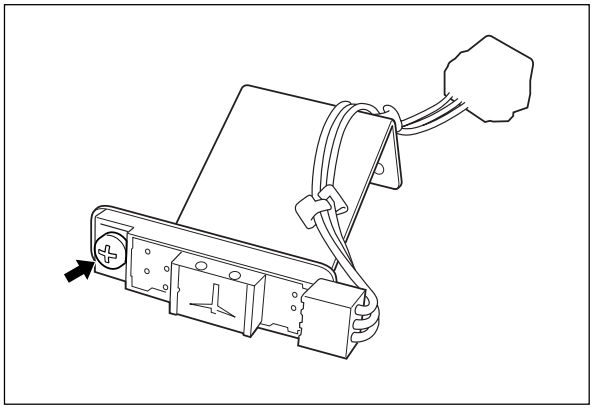


Fig. 13-706

[E] Color auto-toner sensor / Color auto-toner sensor shutter solenoid

(1) Take off the receiving tray (► Chapter 2.5.1 [B]).

(2) Disconnect 1 connector and remove 3 screws. Then take off the color auto-toner sensor unit.

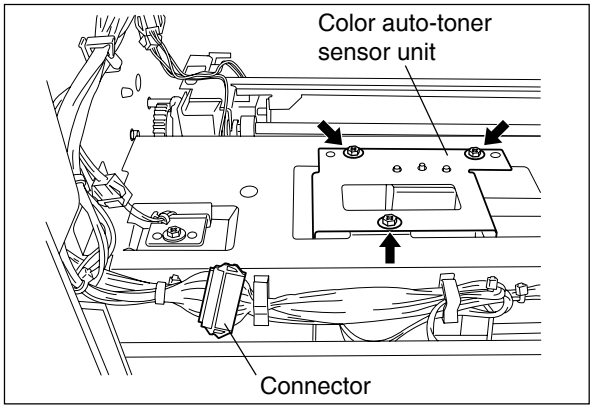


Fig. 13-707

(3) Remove 2 screws, disconnect 1 connector and take off the color auto-toner sensor shutter solenoid.

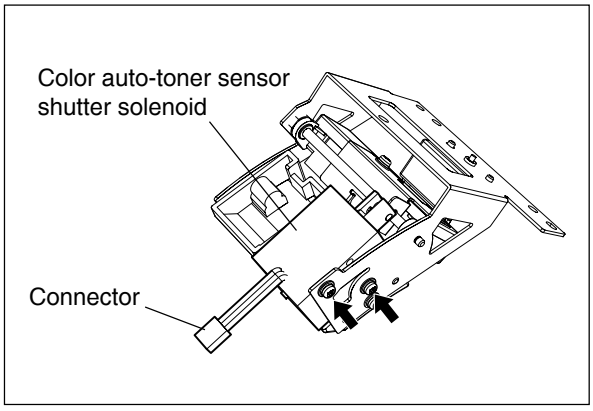


Fig. 13-708

(4) Remove 2 screws and 1 spring and take off the stay.

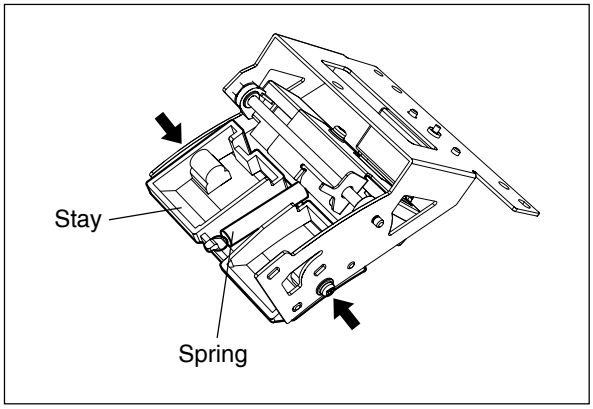


Fig. 13-709

(5) Remove 1 E-ring and shaft and take off the color auto-toner sensor case.

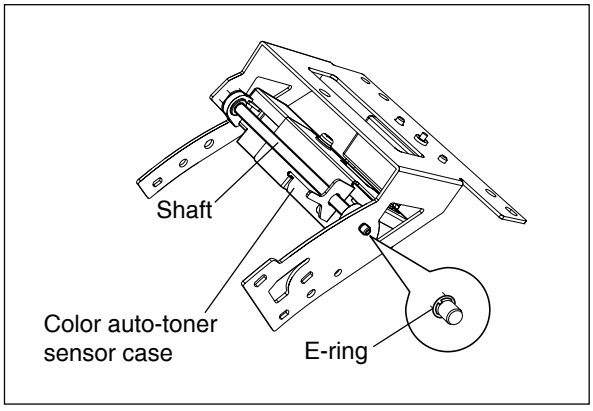


Fig. 13-710

(6) Remove 2 screws and take off the color auto-toner sensor.

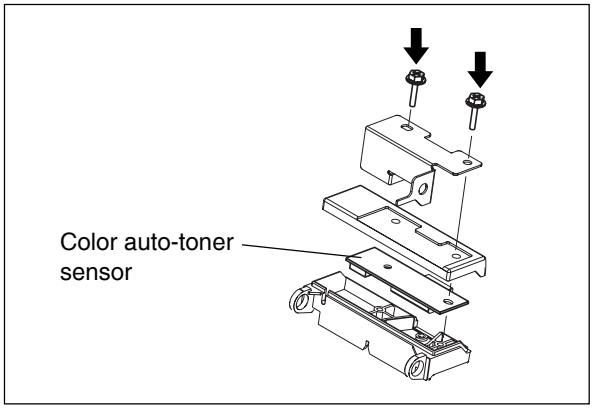


Fig. 13-711

13

[F] Revolver home position sensor

(1) Disconnect 1 connector and remove 1 screw. Then take off the revolver home position sensor with the whole bracket.

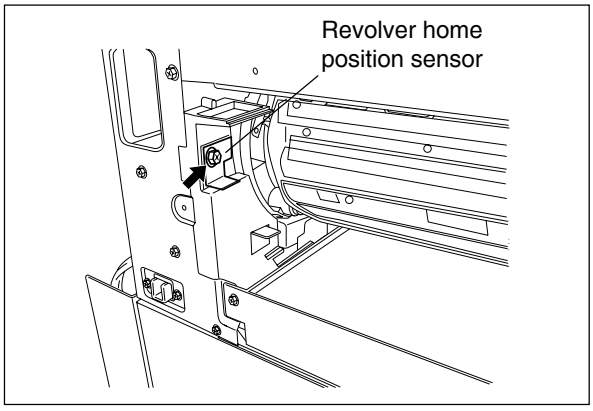


Fig. 13-712

[G] Color developer unit drive gear / Color toner supply drive gear

(1) Take off the color developer unit (► Chapter 13.7 [B]).

(2) Release 2 latches and take off the holder. Then take off the color developer unit drive gear and color toner supply drive gear.

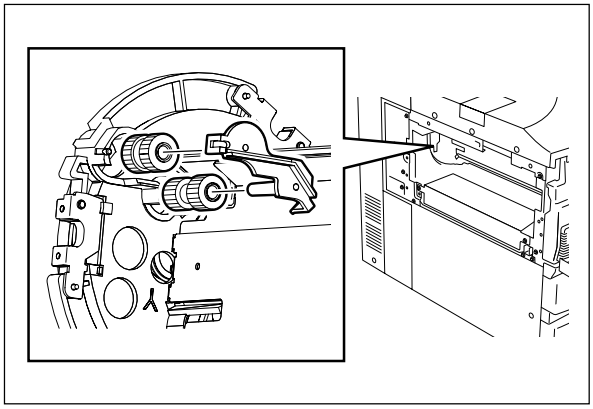


Fig. 13-713

Notes: 1. When installing, insert the shaft of the holder into the revolver unit securely.
2. Apply the grease to the shaft after the replacement of the gears.

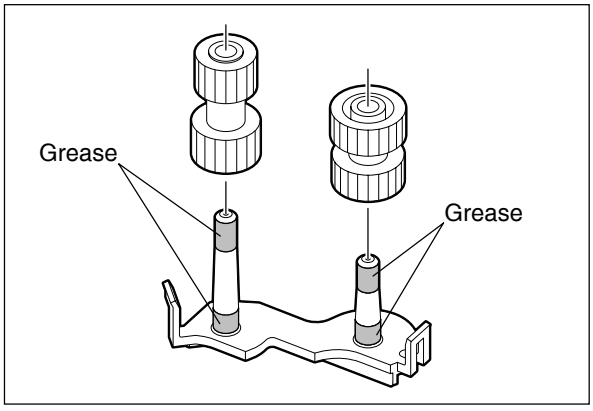


Fig. 13-714

[H] Revolver unit

(1) Take off all of the color developer units (► Chapter 13.7 [B]).
(2) Take off the cleaner unit (► Chapter 11.7 [A]).

Note: When taking off the cleaner, make sure that all the color developer units are taken off in advance. Otherwise the drum surface may be scratched depending on the position of the revolver unit (e.g. developing position).

(3) Take off the receiving tray (► Chapter 2.5.1 [B]).
(4) Take off the left rear cover (► Chapter 2.5.1 [G]).
(5) Take off the color toner cartridge sensor (► Chapter 13.7 [D]).
(6) Take off the color auto-toner sensor (► Chapter 13.7 [E]).
(7) Take off the internal cooling fan (► Chapter 13.7 [I]).
(8) Take off the laser optical unit (► Chapter 8.6 [A]).
(9) Release 2 latches take off the laser cooling duct cover (rear side).
(10) Take off the revolver home position sensor (► Chapter 13.7 [F]).
(11) Remove 2 screws and take off the inner cover.

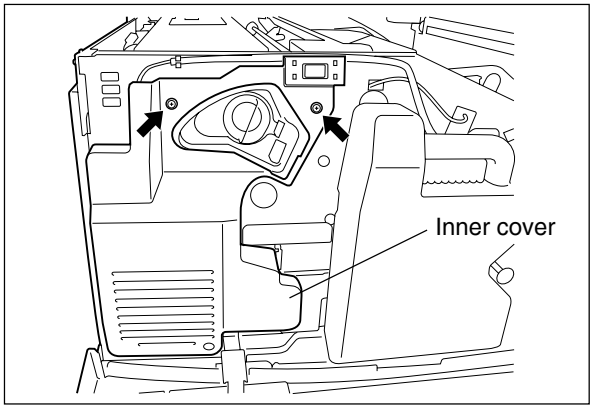


Fig. 13-715

(12) Remove 2 screws and take off the laser cooling duct cover (front side).

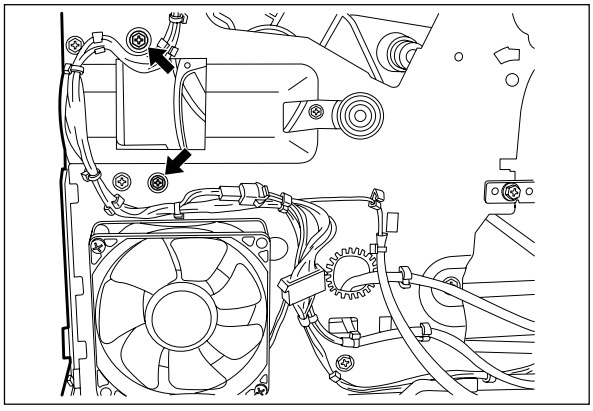


Fig. 13-716

(13) Take off the developer motor drive unit (► Chapter 9.5 [A]).

(14) Remove 1 screw and take off the lock lever.

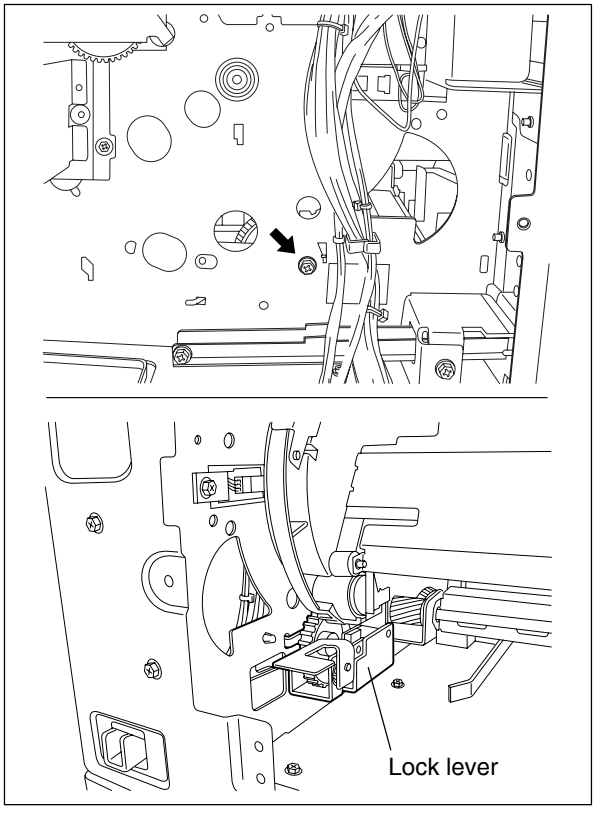


Fig. 13-717

(15) Remove 5 screws and the stay. (Remove 1 of 5 screws from the rear side of the equipment.)

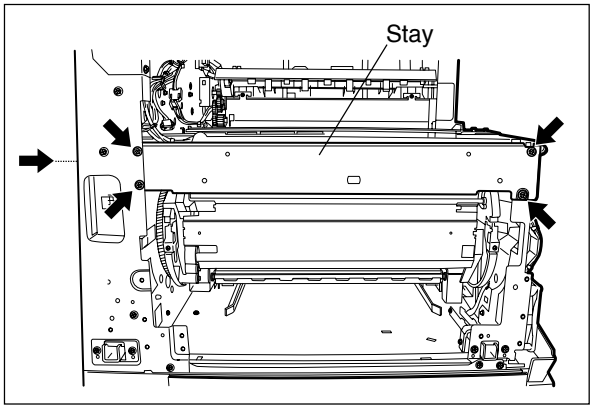


Fig. 13-718

(16) Remove 5 screws and take off the bracket.

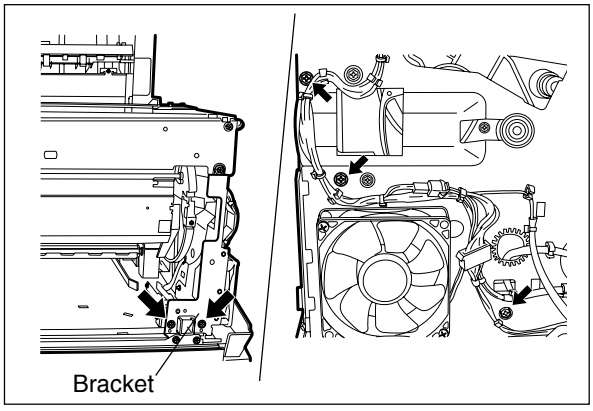


Fig. 13-719

(17) Remove the stopper attached on the front side of the revolver rotary shaft.

(18) Push in the bearing to the inside of the frame and take it off from the frame.

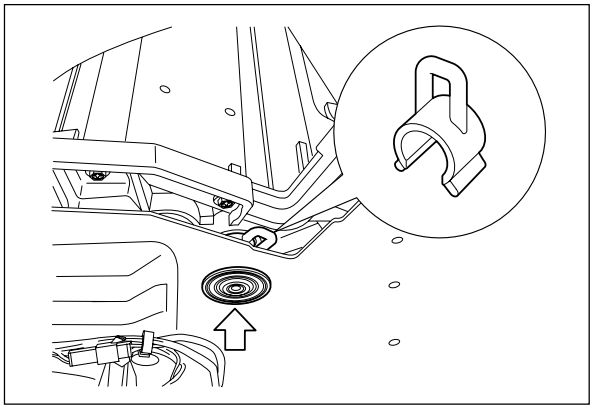


Fig. 13-720

(19) Slide the revolver to the front and take off the bearing attached on the rear side of revolver rotary shaft from the rear frame. Take off the revolver unit with the bearing.

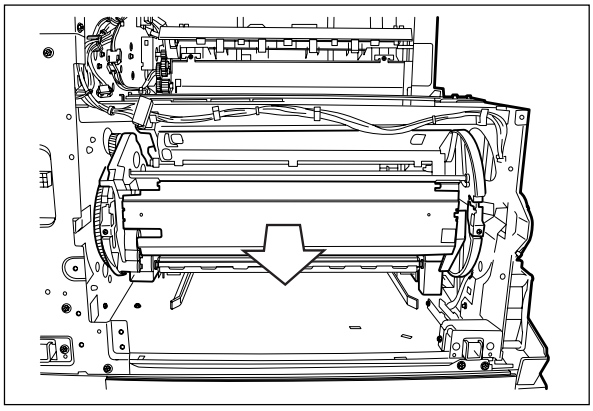


Fig. 13-721

Note: Do not unscrew the red painted screws (6 pcs.) on the revolver unit after taking off the revolver unit.

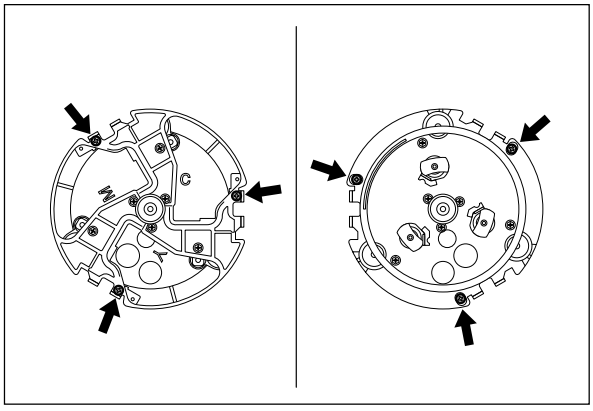


Fig. 13-722

[I] Internal cooling fan

(1) Take off the receiving tray (► Chapter 2.5.1 [B]).

(2) Disconnect 1 connector and remove 2 screws. Then take off the internal cooling fan together with the duct.

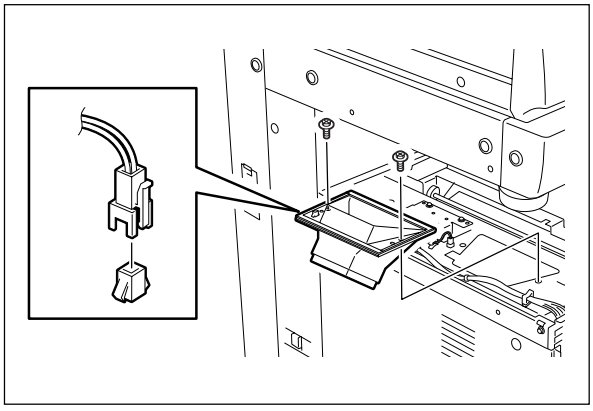


Fig. 13-723

(3) Disconnect 1 connector and remove 2 screws. Then take off the internal cooling fan.

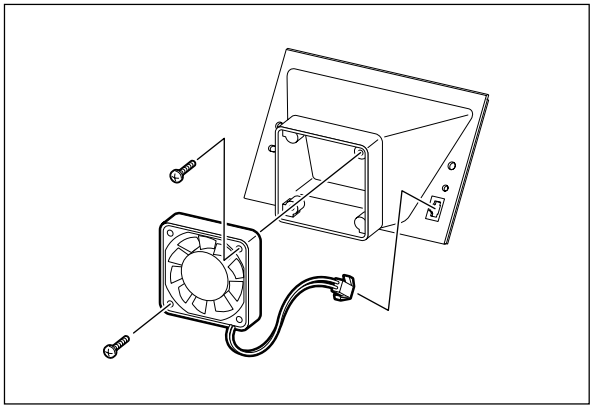


Fig. 13-724

14. TRANSFER UNIT

14.1 General Descriptions

The transfer unit transfers the toner image formed on the photoconductive drum to the transfer belt, and then transfers it to the paper. The transfer of the toner image from the photoconductive drum to the transfer belt is called 1st transfer and the transfer from the transfer belt to the paper is called 2nd transfer. To reproduce a color image, maximum four color images are overlaid on the transfer belt and the overlaid image is then transferred to the paper. Namely, the transfer belt turns four times for printing of one image. The transfer belt rotates with the main motor drive.

14.2 Construction

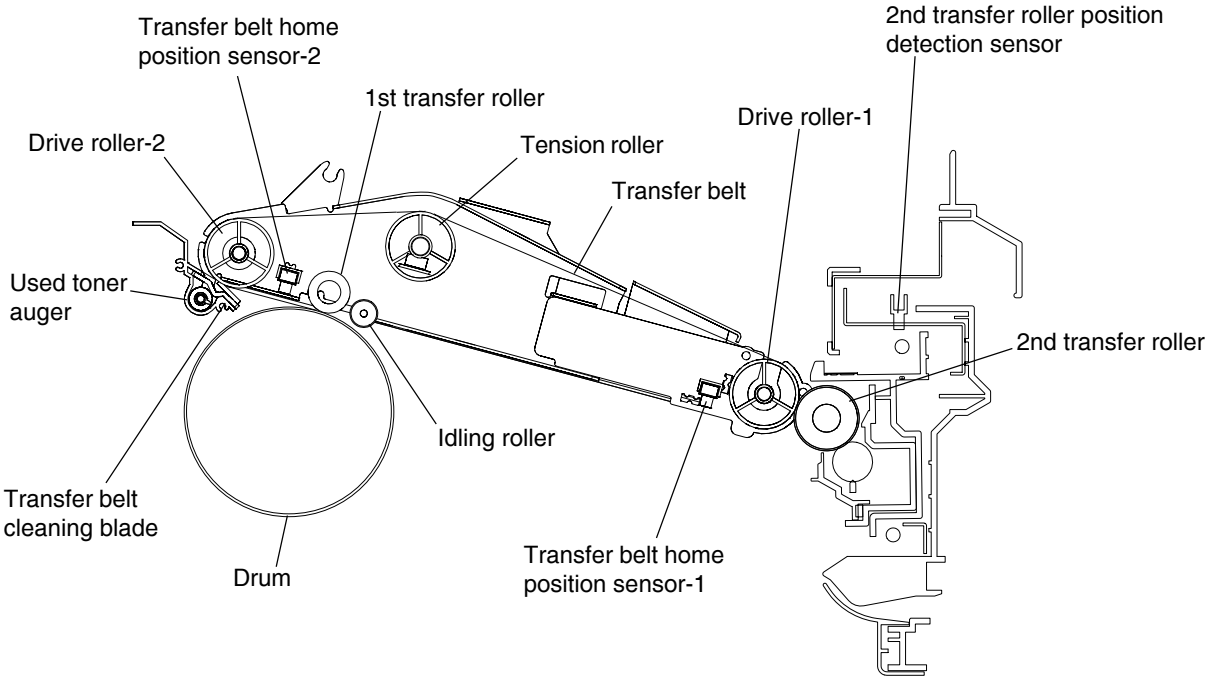


Fig. 14-201

14.3 Functions

(1) Transfer belt
The transfer belt is made by forming resin which has an electrical resistance with high precision. The main motor drive rotates the transfer belt drive roller and that makes to rotate the transfer belt as well.

(2) 1st transfer roller
When the 1st transfer bias from high-voltage power supply is applied, the toner is transferred from photoconductive drum to the transfer belt. The spring presses to contact the transfer belt with the photoconductive drum.

(3) Transfer belt cleaning blade
Removes the residual toner, paper dust or foreign objects on the transfer belt surface. Transfer belt contact clutch performs contact/release movement.

(4) Transfer belt cleaner contact clutch
Performs contact/release movement between the transfer cleaning blade and transfer belt.

(5) Used toner auger
Transports the scraped residual toner and paper dust to the toner bag. The transfer belt cleaner auger motor drives this auger.

(6) Drive roller-1
Rotates the transfer belt. This roller is driven by the transmitted drive from the main motor.

(7) Tension roller
Applies the tensile force to the transfer belt with its spring.

(8) Idling roller
Retains the contacting position of the transfer belt and the photoconductive drum.

(9) Drive roller-2
Contacts the transfer belt cleaning blade to the transfer belt easily. Also retains the contacting position of the transfer belt and the photoconductive drum.

(10) Transfer belt home position sensor-1 and 2
Detects the home position of transfer belt. This reflection type sensor detects the reflection tape inside of the transfer belt.

(11) 2nd transfer roller
When the 2nd transfer bias from high-voltage power supply is applied, the toner is transferred from the transfer belt to the paper.

(12) 2nd transfer roller contact clutch

This clutch is an electromagnetic clutch which contacts or releases the 2nd transfer roller to the transfer belt. The 2nd transfer roller contacts when this clutch turns ON and releases when it turns OFF. Since the transport motor is its drive source, the clutch needs to be ON as long as they are contacting.

It also controls the clutch not to turn more than 180 degrees by the spring and stopper.

(13) 2nd transfer roller cleaning brush

When the toner is remaining on the 2nd transfer roller, it may stain the rear side of the paper. This brush cleanses the 2nd transfer roller to prevent stain. In addition, the 2nd transfer section needs a periodical cleaning since this section has no mechanism discharging scraped toner.

(14) 2nd transfer roller position detection sensor

This sensor is a photointerrupter detecting whether the 2nd transfer roller is at its contacting position or releasing position.

(15) Paper clinging detection sensor

When the thin paper which is out of specification passes through, the thin paper may cling to the transfer belt surface. In this case, the paper clinging to the belt cannot be removed in a usual jam processing and thus a service call occurs. To prevent this, the sensor detects whether the thin paper is clinging to the transfer belt or not, and processes this case as a paper jam.

14.4 Outline of 1st transfer

(1) The transfer belt contacts with the photoconductive drum. Power voltage is applied through the 1st transfer roller and it transfers the toner onto the transfer belt.
(2) The transfer belt home position sensor-2 detects its home position and overlays four color images.
(3) When the transfer of the toner image from the transfer belt to the paper is completed in 2nd transfer, residual toner on the transfer belt is scraped off by the transfer belt cleaning blade.

14.5 Outline of 2nd transfer

(1) The 2nd transfer roller stays at the released position from the transfer belt in 1st transfer.
(2) Upon the completion of 1st transfer, the 2nd transfer roller starts to rotate and moves to the transfer position.
(3) After an electrode bias is applied on the 2nd transfer roller, the toner image is transferred from the transfer belt to the paper.
(4) Upon the completion of 2nd transfer, the 2nd transfer roller escapes to the releasing position.

14.6 High-Voltage Power Supply

High-voltage power supply outputs the voltage of positive/negative polarity.

When the voltage of positive polarity is supplied to the 2nd transfer roller, the toner will be supplied from the intermediary belt to the paper.

When the voltage of negative polarity is supplied to the 2nd transfer roller, the toner on the 2nd transfer roller is transferred to the transfer belt reversely. The toner on the transfer belt is eliminated by the cleaning unit and thus cleaning of the 2nd transfer roller is performed.

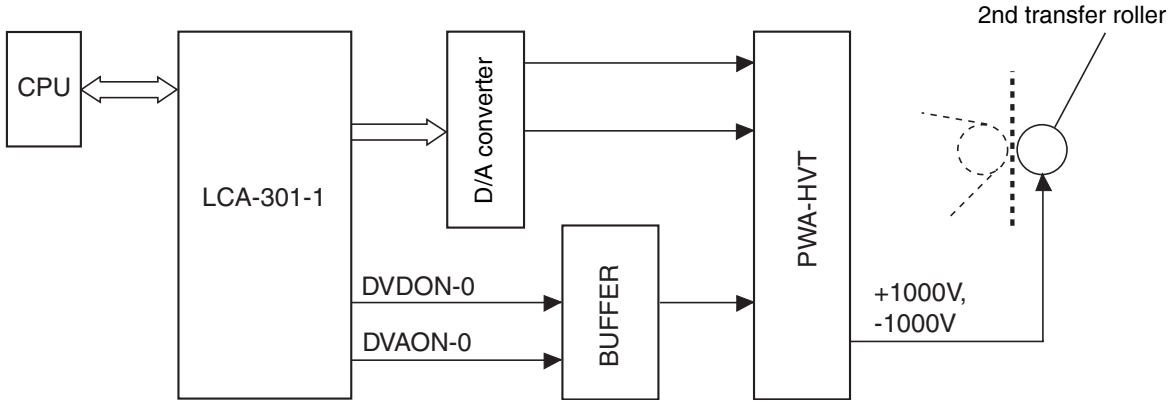


Fig. 14-601

14.7 Disassembly and Replacement

[A] Transfer belt unit

Note: Wearing gloves is recommended to avoid direct touch by bare hands to the transfer belt surface.

(1) Take off the drum cleaner unit (► Chapter 11.7 [A]).

(2) Take off the receiving tray (► Chapter 2.5.1 [B]).

(3) Take off the tray back cover (► Chapter 2.5.1 [C]).

(4) Unlock the fixing lever on the rear side by rotating it.

(5) Unlock the fixing lever on the front side by sliding it.

(6) Remove 1 screw and take off the fixing lever on the front side.

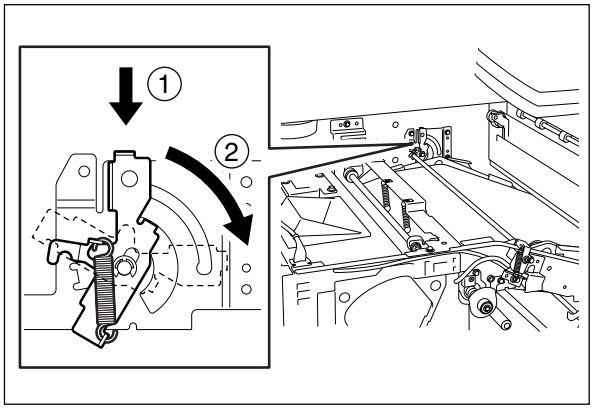


Fig. 14-701

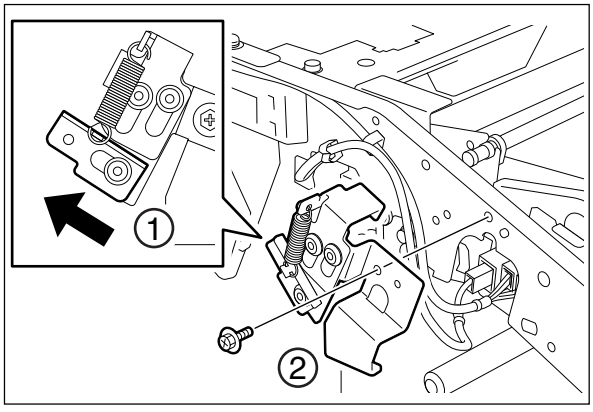


Fig. 14-702

(7) Disconnect 3 connectors.

Note: Make sure to connect each connector to the socket in the same color as that of the connector.

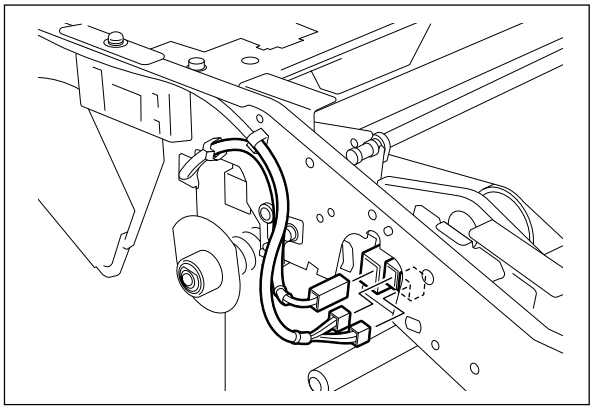


Fig. 14-703

(8) Loosen 3 screws and take off the bracket.

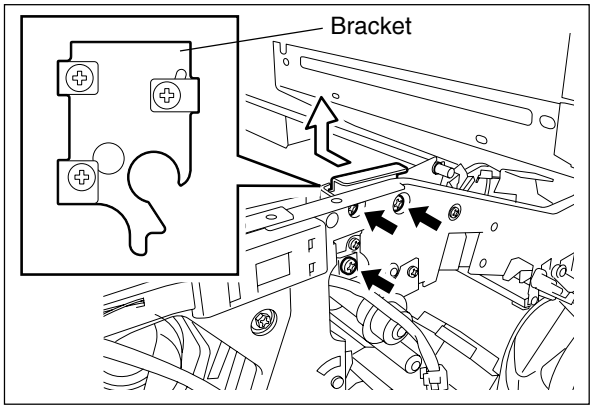


Fig. 14-704

(9) Lift up the transfer belt cleaning unit and move it out to the front side temporarily. Then place the unit on the rear frame and front frame.

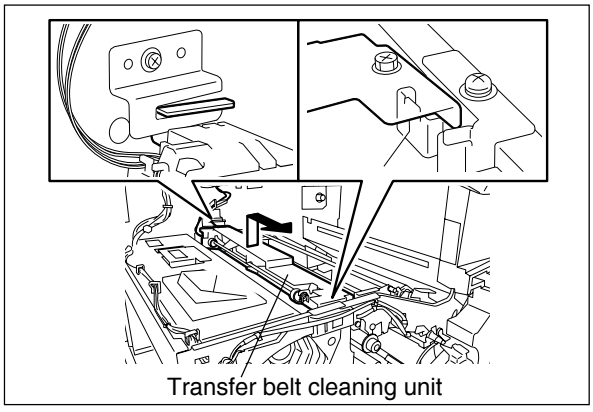


Fig. 14-705

(10) Pull out the transfer belt unit.

Notes: 1. When installing or taking off the transfer belt unit, be careful not to scratch the transfer belt.

2. Do not touch the transfer belt surface with bare hands.

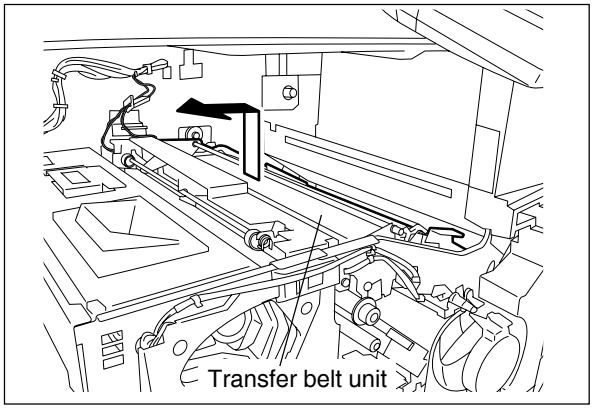


Fig. 14-706

3. When the transfer belt unit has been installed or contact/release operation of the unit has been performed, press the unit down until the unit is securely fixed (as shown in the figure at right) to engage the transfer belt drive gear.

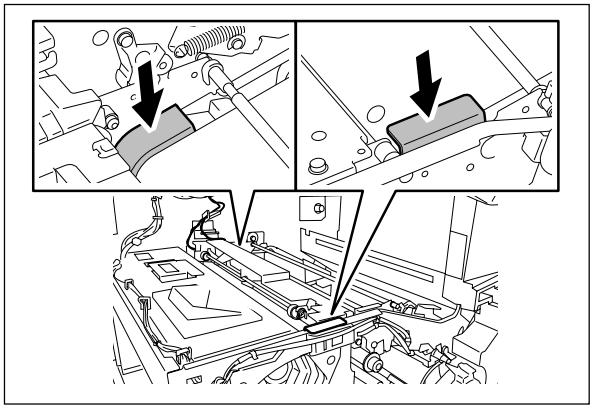


Fig. 14-707

4. If the transfer belt drive gear is not properly engaged, the hole positions of the fixing screw (as shown in the figure at right) may not match. In this case, operate the main motor for approx. 1 second in the Test Mode (03-101) to engage the drive gear securely and then install the unit.

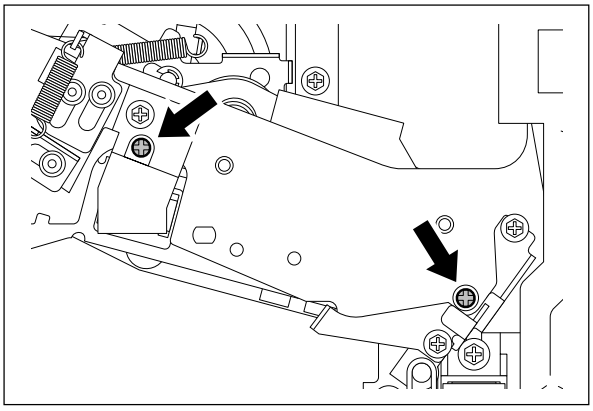


Fig. 14-708

[B] Transfer belt PM

Note: Wearing gloves is recommended to avoid direct touch by bare hands to the transfer belt surface.

(1) Take off the transfer belt unit (► Chapter 14.7 [A]).

(2) Remove 2 clips and take off the shaft by sliding it to the rear side.

Note: When installing the shaft, insert the narrow part of the shaft into the stay on the rear side and fit it into the front side by sliding it.

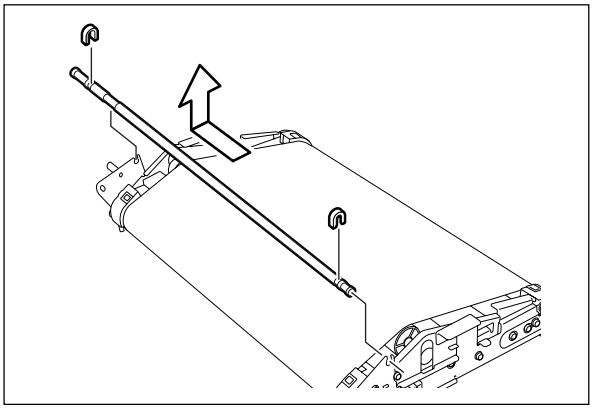


Fig. 14-709

(3) Remove 1 screw and 2 stand plates.

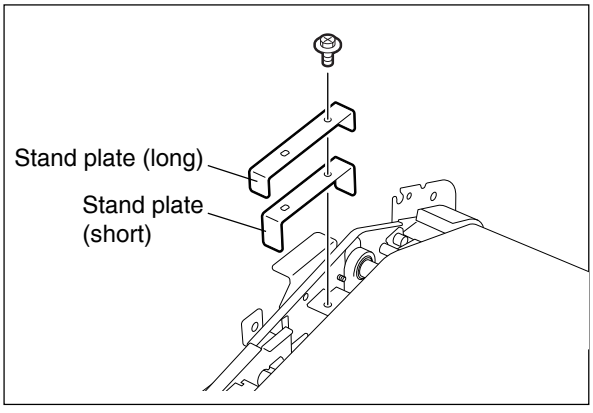


Fig. 14-710

(4) Remove 2 screws and take off the bracket.

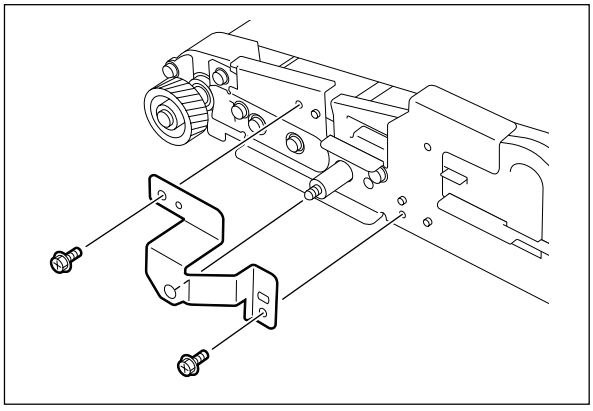


Fig. 14-711

(5) Install the stand plate (short) on the rear side of the transfer belt unit using the screw which is removed in step (3).

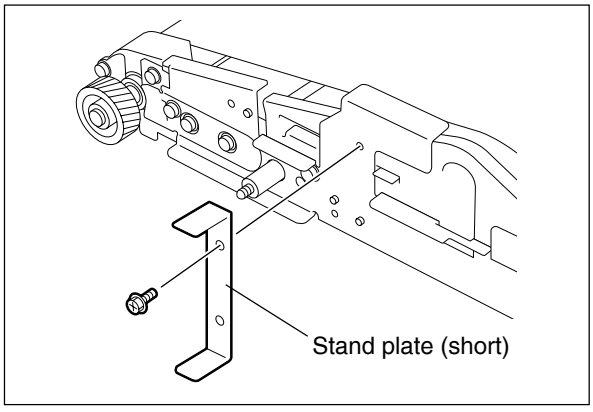


Fig. 14-712

(6) Stand the transfer belt unit with its rear side on the bottom.
(7) Remove 3 screws and the stay.

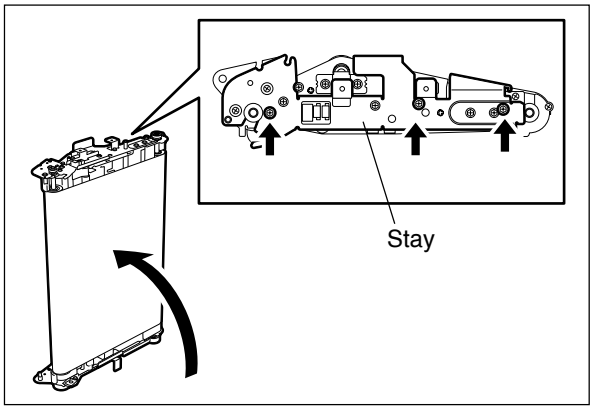


Fig. 14-713

(8) Install the stand plate (long) on the front side of the transfer belt unit using the screw which is removed in step (7).

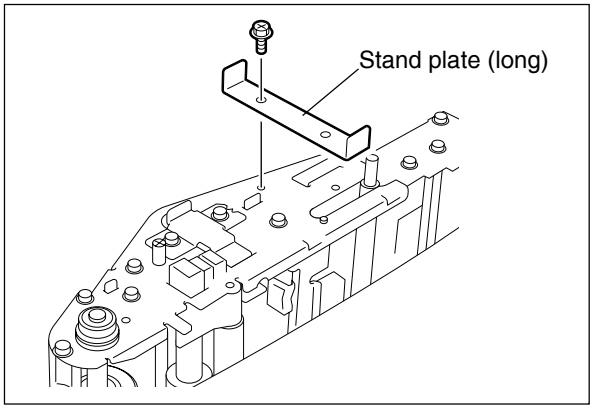


Fig. 14-714

(9) Stand the transfer belt unit with its front side on the bottom.

(10) Remove 3 screws.

(11) Incline the transfer belt unit so that the shaft is pulled in the unit. Then remove the stay while the shaft is hidden in the unit.

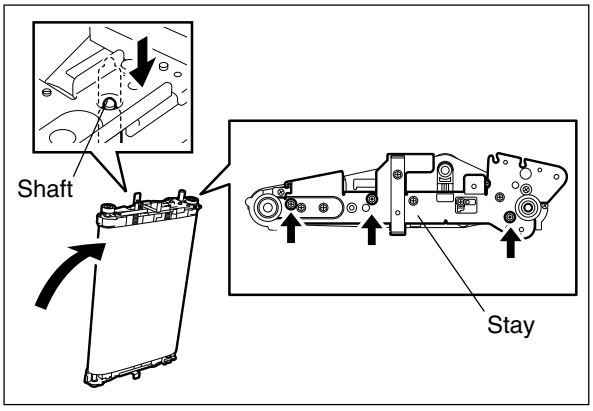


Fig. 14-715

(12) Narrow the distance of rollers and pull out the transfer belt unit.

Notes: 1. When installing the transfer belt, make sure it is set at the center not to be moved aside.

2. Make sure that the reflection tape inside of the belt is on the rear side.
3. Do not touch the transfer belt surface with bare hands.
4. Be careful not to scratch the transfer belt.
5. Check the color deviation after replacing the transfer belt.
6. When replacing the transfer belt, remove the oil from drive roller-1, drive roller-2, tension roller, with a solvent such as alcohol first, and attach the transfer belt.

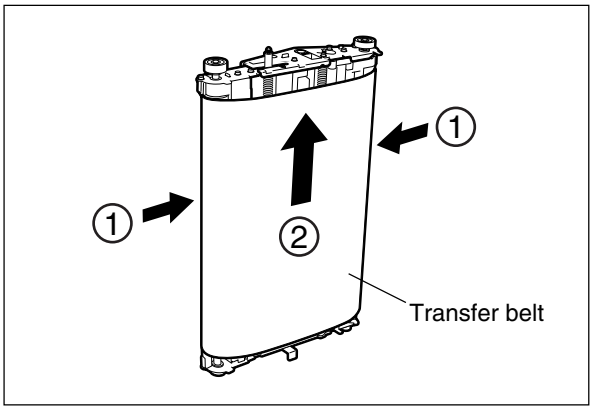


Fig. 14-716

14

[C] 1st transfer roller PM

(1) Take off the transfer belt (► Chapter 14.7 [B]).

(2) Remove 1 screw and the plate spring.

(3) Remove 1 screw and take off the bracket. Then take off the 1st transfer roller and idling roller.

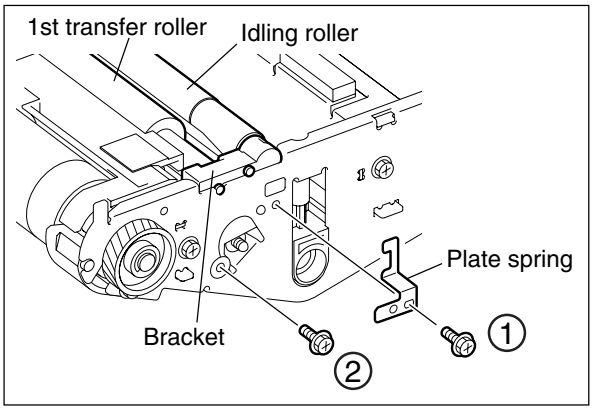


Fig. 14-717

[D] Transfer belt home position sensor-1

(1) Take off the transfer belt (► Chapter 14.7 [B]).

(2) Remove 1 screw and take off the cover.

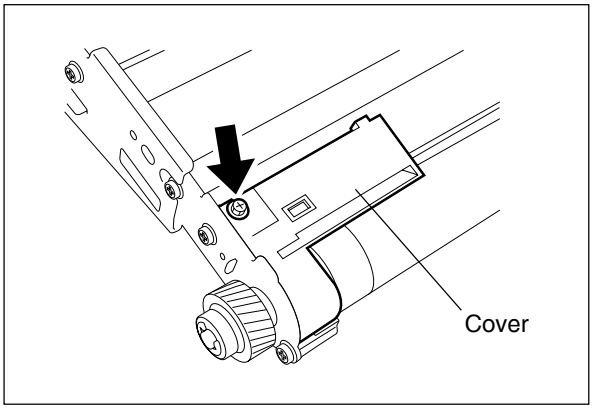


Fig. 14-718

(3) Remove 1 screw and disconnect 1 connector. Then take off the transfer belt home position sensor-1.

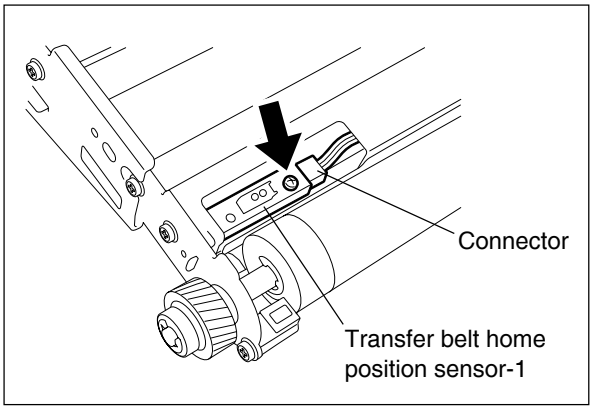


Fig. 14-719

[E] Transfer belt home position sensor-2

(1) Take off the transfer belt (► Chapter 14.7 [B]).

(2) Remove 1 screw and take off the cover.

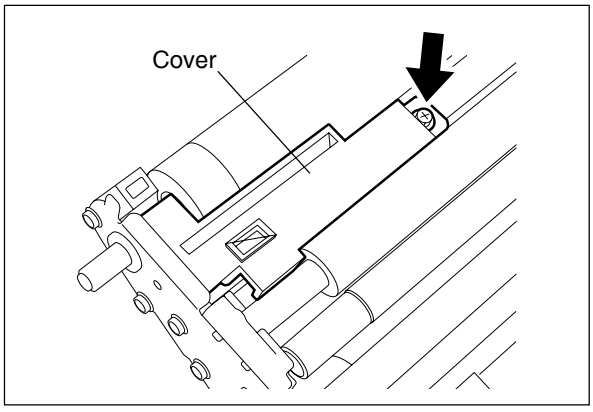


Fig. 14-720

(3) Remove 1 screw and disconnect 1 connector. Then take off the transfer belt home position sensor-2.

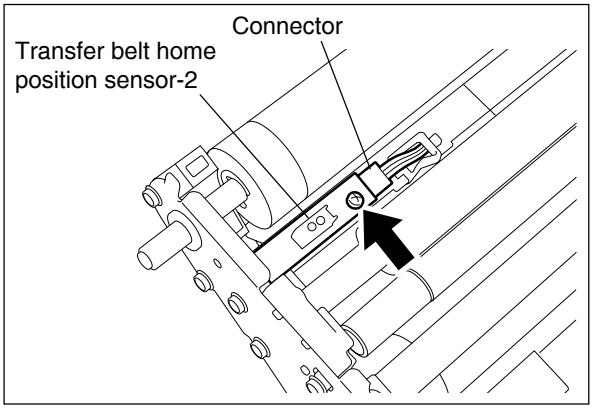


Fig. 14-721

[F] Transfer belt cleaning unit

(1) Take off the drum cleaner unit (► Chapter 11.6 [A]).

Note: When installing the transfer belt cleaning unit, make sure to take off the drum cleaner unit in advance since it may scratch the drum.

(2) Take off the transfer belt unit (► Chapter 14.7 [A]).

(3) Disconnect 2 connectors and take off the transfer belt cleaning unit.

Note: Do not incline the transfer belt cleaning unit steeply since the toner may fall off.

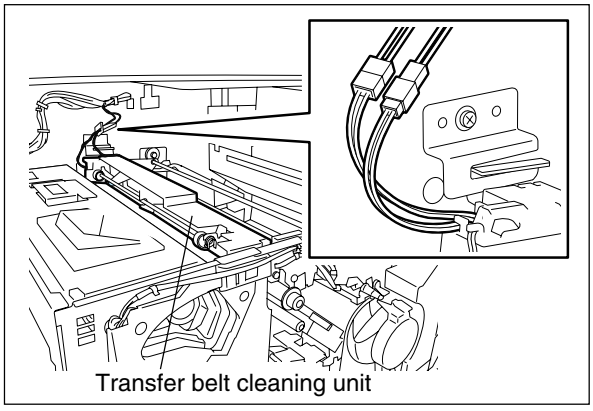


Fig. 14-722

[G] Transfer belt cleaning blade / Blade seal PM

(1) Take off the transfer belt cleaning unit (► Chapter 14.7 [F]).

(2) Remove 2 blade seals on both ends of the transfer belt cleaning blade.

Notes: 1. When putting the blade seal, push the seal firmly in the directions of the arrows in the figure at right. Make sure that there is no gap between the blade and seal.

2. Do not mix up the blade seal for front side and one for rear side since they differ each other.

(3) Release 2 latches and take off the cover.

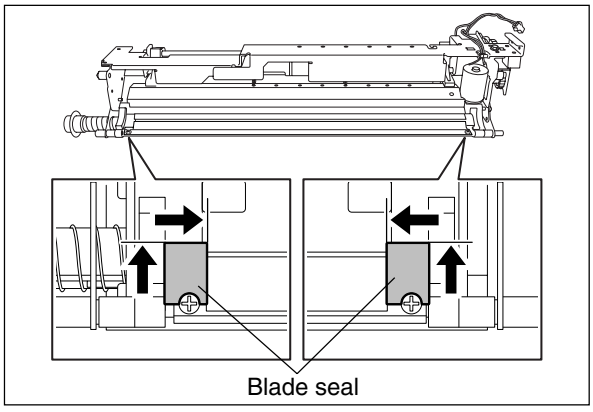


Fig. 14-723

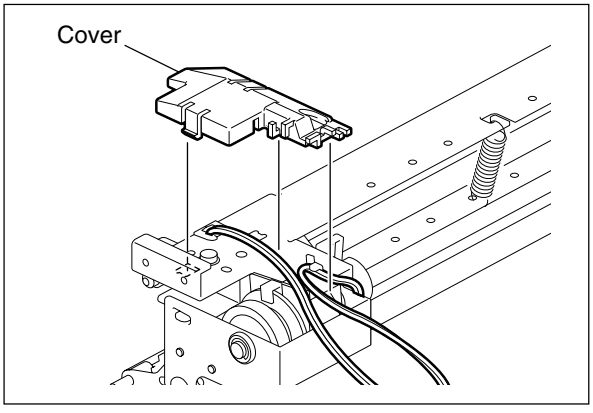


Fig. 14-724

(4) Remove 1 screw and take off the bracket on the front side.

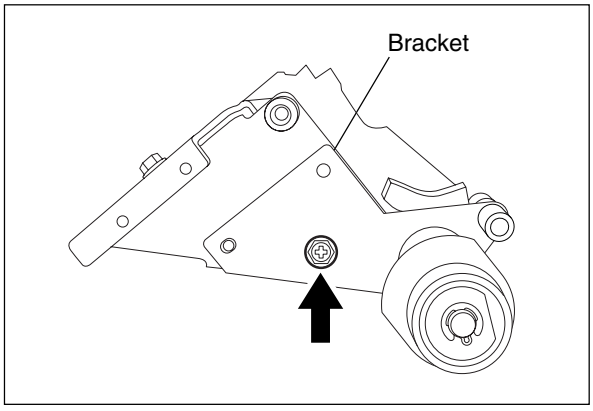


Fig. 14-725

(5) Remove 1 screw and take off the bracket on the rear side.

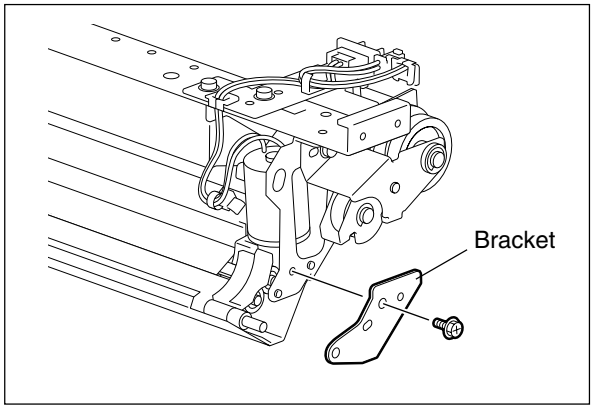


Fig. 14-726

(6) Remove 2 springs.

Note: When installing the transfer belt cleaning unit, after it's completion, make sure the springs do not come off.

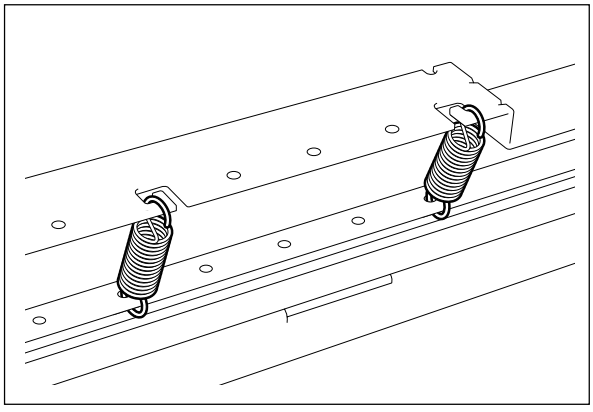


Fig. 14-727

(7) Separate the transfer belt cleaning unit into 2 parts.

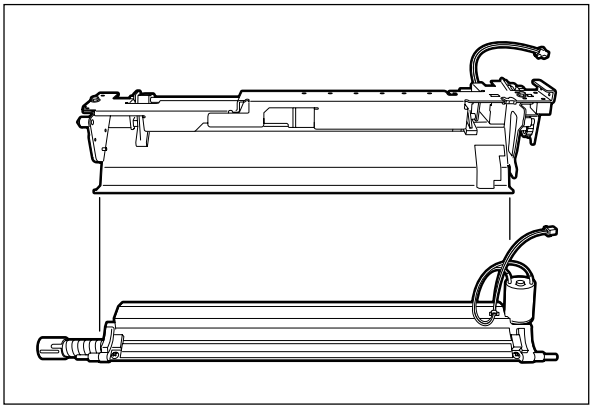


Fig. 14-728

(8) Remove 3 conductive tapes.

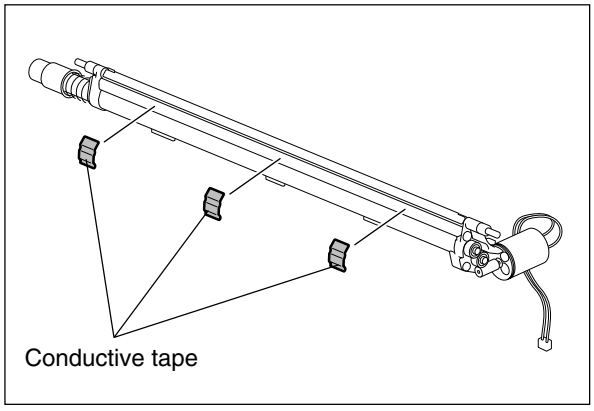


Fig. 14-729

Note: When assembling, use the new conductive tape. Also, attach the conductive tape to the transfer belt cleaning blade referring to the figure on the right.

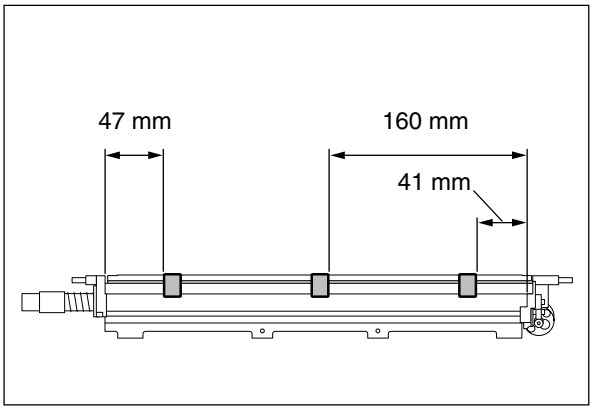


Fig. 14-730

(9) Remove 2 screws and take off the transfer belt cleaning blade.

Notes: 1. Make sure not to touch or damage the edge of the blade.
2. Check the color deviation after replacing the transfer belt cleaning blade.

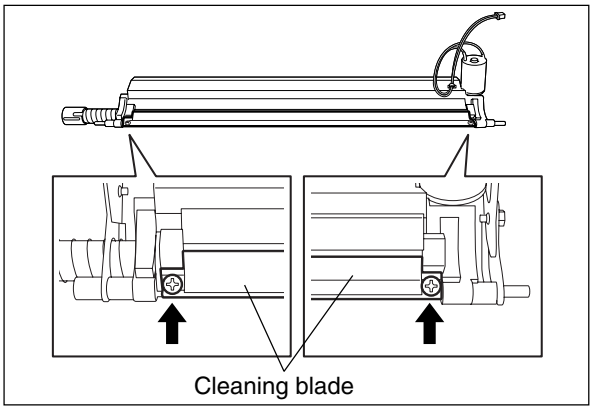


Fig. 14-731

[H] Transfer belt cleaner auger motor / Transfer belt cleaner clutch

(1) Take off the transfer belt cleaning unit (► Chapter 14.7 [F]).
(2) Separate the transfer belt cleaning unit into 2 parts. (► Chapter 14.7 [G]).
(3) Release the latch and take off the gear.

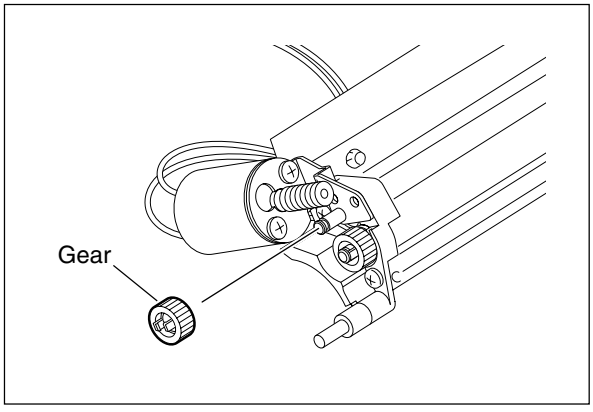


Fig. 14-732

(4) Remove the harness clamp. Remove 1 screw and take off the transfer belt cleaner auger motor with the whole bracket.

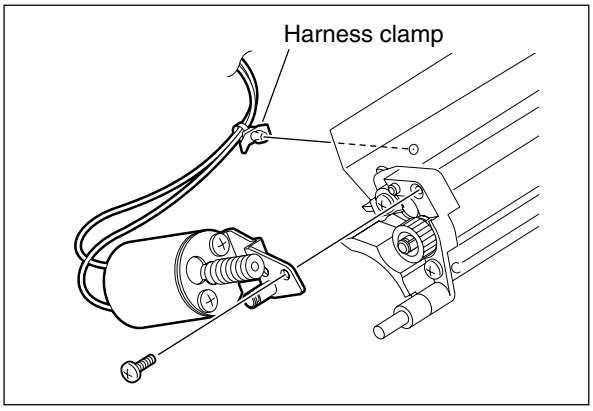


Fig. 14-733

(5) Remove 2 screws and take off the transfer belt cleaner auger motor from the bracket.

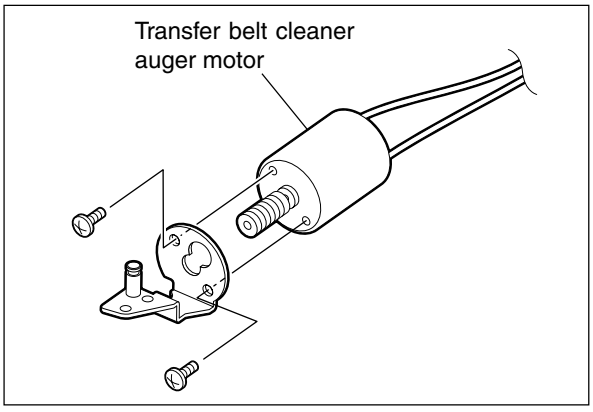


Fig. 14-734

(6) Remove 1 clip and take off 1 bushing. Then take off the assembly of the shaft and clutch.

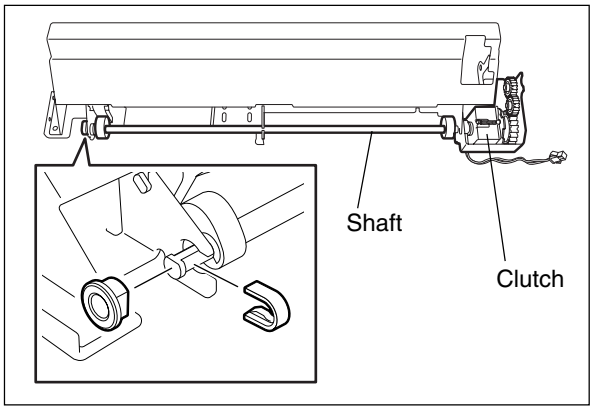


Fig. 14-735

(7) Remove 1 clip. Remove 1 E-ring and take off the bushing-1, and then take off the bushing-2 with the shaft. Take off the transfer belt cleaner clutch.

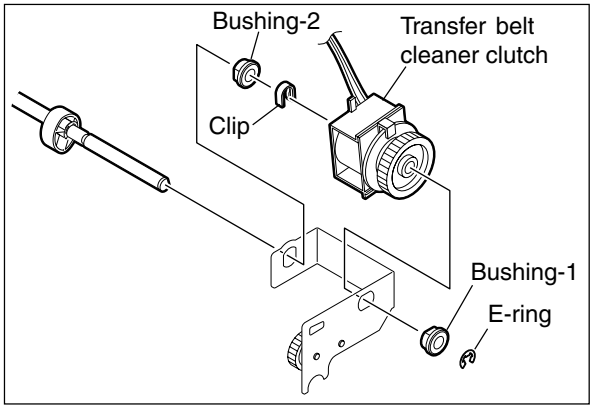


Fig. 14-736

[I] 2nd transfer roller PM

(1) Open the 2nd transfer unit.

(2) Release 4 latches and take off the cover.

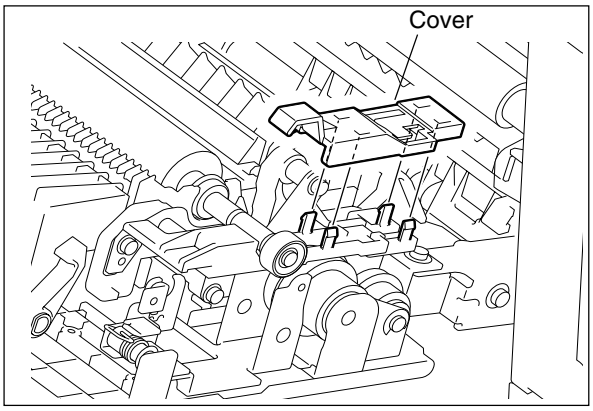


Fig. 14-737

(3) Remove 1 clip. Take off the 2nd transfer roller while pushing the shaft.

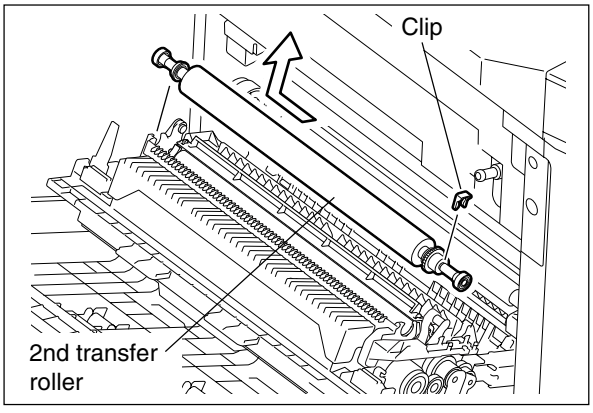


Fig. 14-738

(4) Remove each part from the 2nd transfer roller in order.

Notes: 1. When assembling, pay attention to the direction of the collar-2.

2. After assembling, check if the bushing-1, bearing and collar-2 slide smoothly along the axis of the shaft.

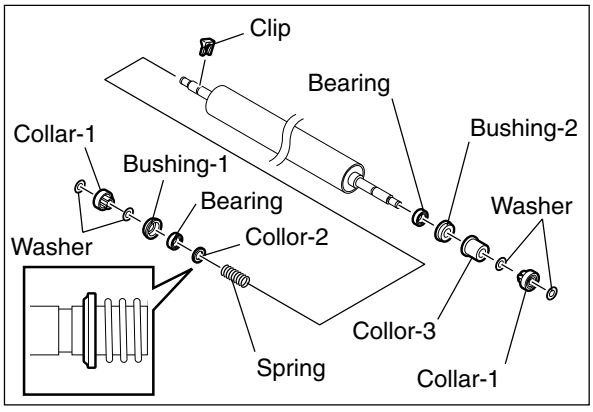


Fig. 14-739

[J] 2nd transfer unit

(1) Take off the ADU (► Chapter 17.5 [A]).

(2) Take off the bypass unit (► Chapter 10.4 [A]).

(3) Take off the right rear cover (► Chapter 2.5.1 [L]).

(4) Remove 2 clips and 1 spring, and then take off the slide hinge on the front side.

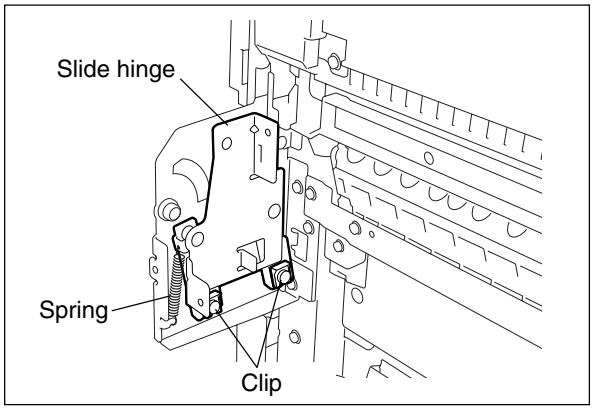


Fig. 14-740

(5) Open the 2nd transfer unit. Disconnect 2 connectors, then remove 1 screw and the ground wire. Remove 1 harness clamp.

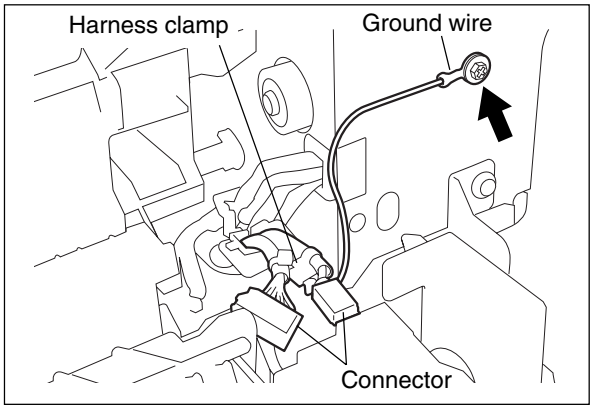


Fig. 14-741

(6) Take off the 2nd transfer unit.

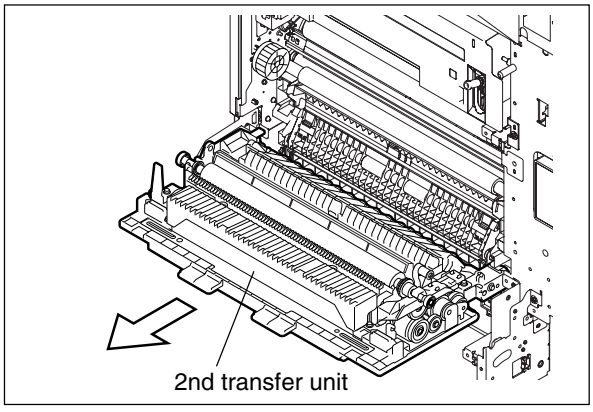


Fig. 14-742

[K] 2nd transfer roller contact clutch

(1) Take off the 2nd transfer unit (► Chapter 14.7 [J]).
(2) Take off the 2nd transfer roller (► Chapter 14.7 [I]).
(3) Remove 4 screws. Remove 1 screw and 2 ground wires, and then take off the transfer guide.

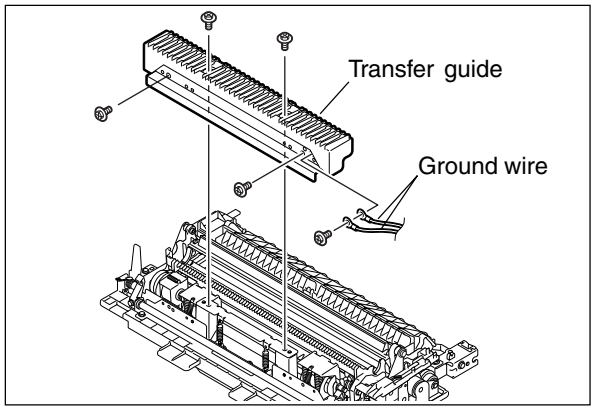


Fig. 14-743

(4) Remove 2 tension springs.
(5) Remove 2 clips.
(6) Take off the bushing-1 and slide the bushing-2.

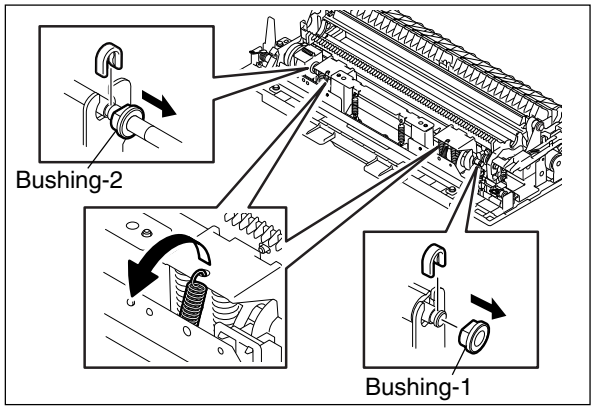


Fig. 14-744

(7) Remove 1 screw and the pin. (Front side)
(8) Remove 1 screw and the pin. (Rear side)
(9) Disconnect 1 connector and take off the case.

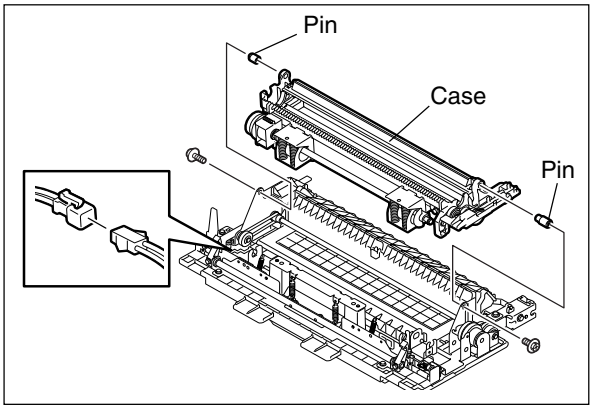


Fig. 14-745

(10) Remove 1 clip and take off the 2nd transfer roller contact clutch.

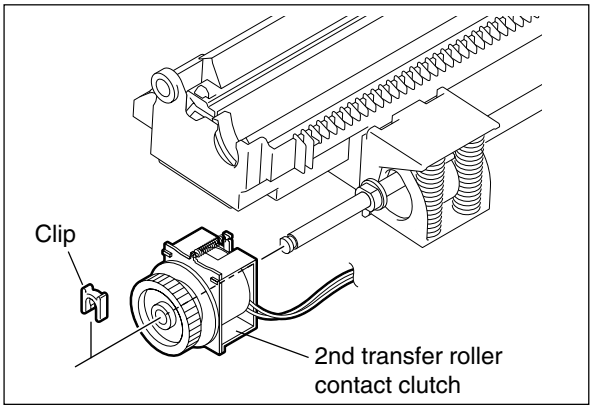


Fig. 14-746

[L] 2nd transfer roller position detection sensor

(1) Take off the 2nd transfer unit
(► Chapter 14.7 [J]).
(2) Take off the case (► Chapter 14.7 [K]).
(3) Disconnect 1 connector. Then take off the 2nd transfer roller position detection sensor.

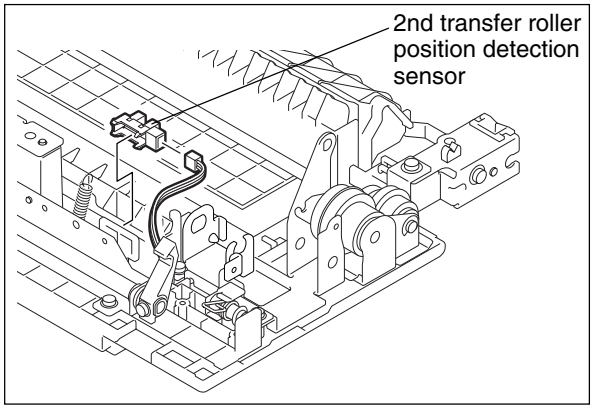


Fig. 14-747

[M] Paper clinging detection sensor

(1) Take off the transfer belt unit
(► Chapter 14.7 [A]).
(2) Open the ADU and 2nd transfer unit.
(3) Remove 1 screw to slide the bracket downward. Then disconnect 1 connector.

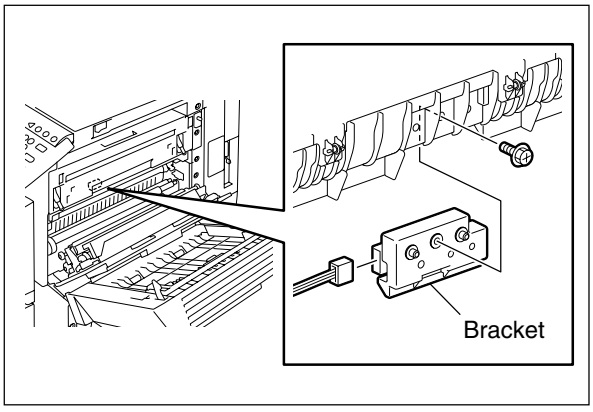


Fig. 14-748

(4) Remove 1 screw. Then take off the paper clinging detection sensor from the bracket.

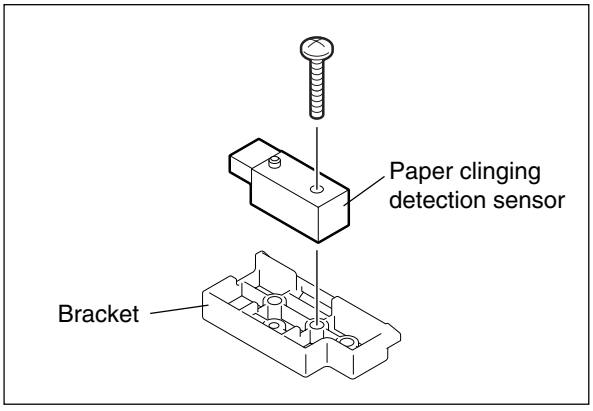


Fig. 14-749

15. IMAGE QUALITY CONTROL

15.1 General Description

In this equipment, image quality is controlled by the image quality sensor. At this control, image forming conditions are automatically adjusted so as to minimize the change in the image density or tone reproduction caused by the fluctuation of working environment or life of supply items.

At first, the image quality sensor operates to output reflected light amount voltage when no toner image is formed on the transfer belt. The output voltage is then converted analog-to-digital to be output as the reflected light amount signal. The light source amount voltage of the sensor is adjusted to correspond with the value set in advance and the output value of reflected light amount signal at this adjustment is stored. This output value is considered as the reading of the belt surface. Next, the sensor outputs the reflected light amount signal when a test pattern is developed on the transfer belt. This output value is considered as the reading of the toner image.

The difference between the reading of the transfer belt and that of the toner image is defined as toner adhesion amount. Image forming conditions are determined in approximating this toner adhesion amount to the value set in advance.

In addition, a shutter operated by the solenoid is equipped on the light receiving/emitting surfaces to prevent stain to the sensor and to calibrate the sensor with the reflection from the shutter.

15.2 Principle of the Sensor

Image quality sensor projects light onto the transfer belt and the toner image (test pattern) developed on the transfer belt to output a voltage corresponding to the reflected light amount.

The output voltage is then converted analog-to-digital into reflected light amount signal. The CPU calculates the toner adhesion amount to control the image forming conditions.

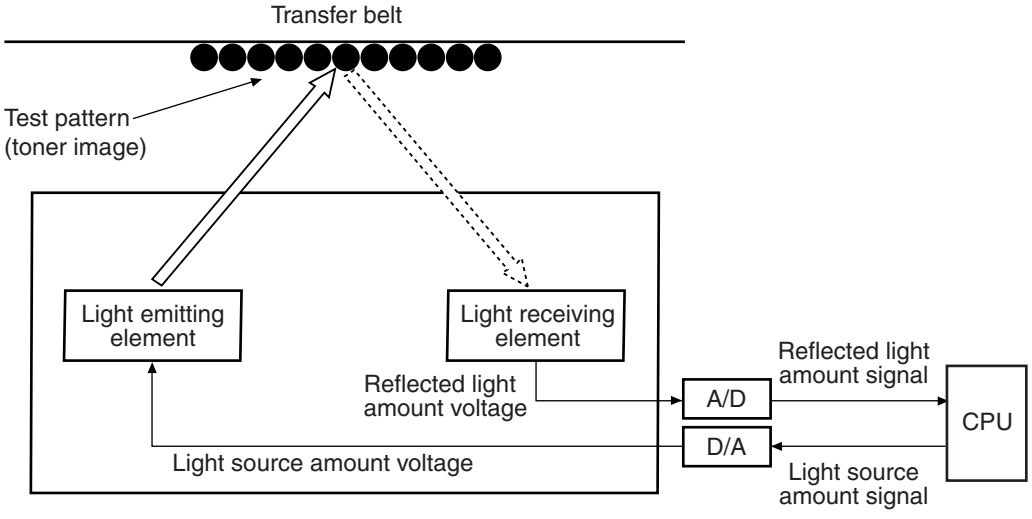


Fig. 15-201

15.3 Flow Chart of Control Procedure

Start of control procedure (when meeting the image quality control starting conditions such as power-ON)

[1] The surface potential of photoconductive drum is estimated with the drum thermistor and temperature/humidity sensor.

↓

[2] Reference image forming conditions are set.

↓

[3] The sensor light source is adjusted.

↓

[4] The test pattern is formed on the transfer belt. ← Return to [4].

↓

[5] Toner adhesion amount of test pattern (high density) is calculated.

↓

[6] Judgment
(whether the toner adhesion amount of the test pattern is within the acceptable range or not)

NO → Modifies the image forming conditions. → Return to [4].

YES

[7] Toner adhesion amount of the test pattern (low density) is calculated.

↓

[8] Judgment
(whether the toner adhesion amount of the test pattern is within the acceptable range or not)

NO → Modifies the image forming conditions. → The test pattern is formed on the transfer belt. → Return to [8].

YES

[9] The image forming conditions are determined and stored in NVRAM.

↓

[10] Control procedure is completed.
(The determined image forming conditions will be reflected on subsequent copies.)

15.4 Construction

· Image quality sensor: Projects the amount of light on the transfer belt and outputs the voltage corresponding to the reflected light amount from the transfer belt or the toner image on the transfer belt.

· D/A converter: Converts light source amount signal into the voltage to the sensor.

· Laser optical system: Performs test pattern exposure (for toner image formation).

· A/D converter: Converts the output voltage from the sensor into digital values and outputs them to the CPU.

· Image forming process: Performs charging, laser exposing and developing processes.

· CPU: Performs steps [1] to [10] described previously.

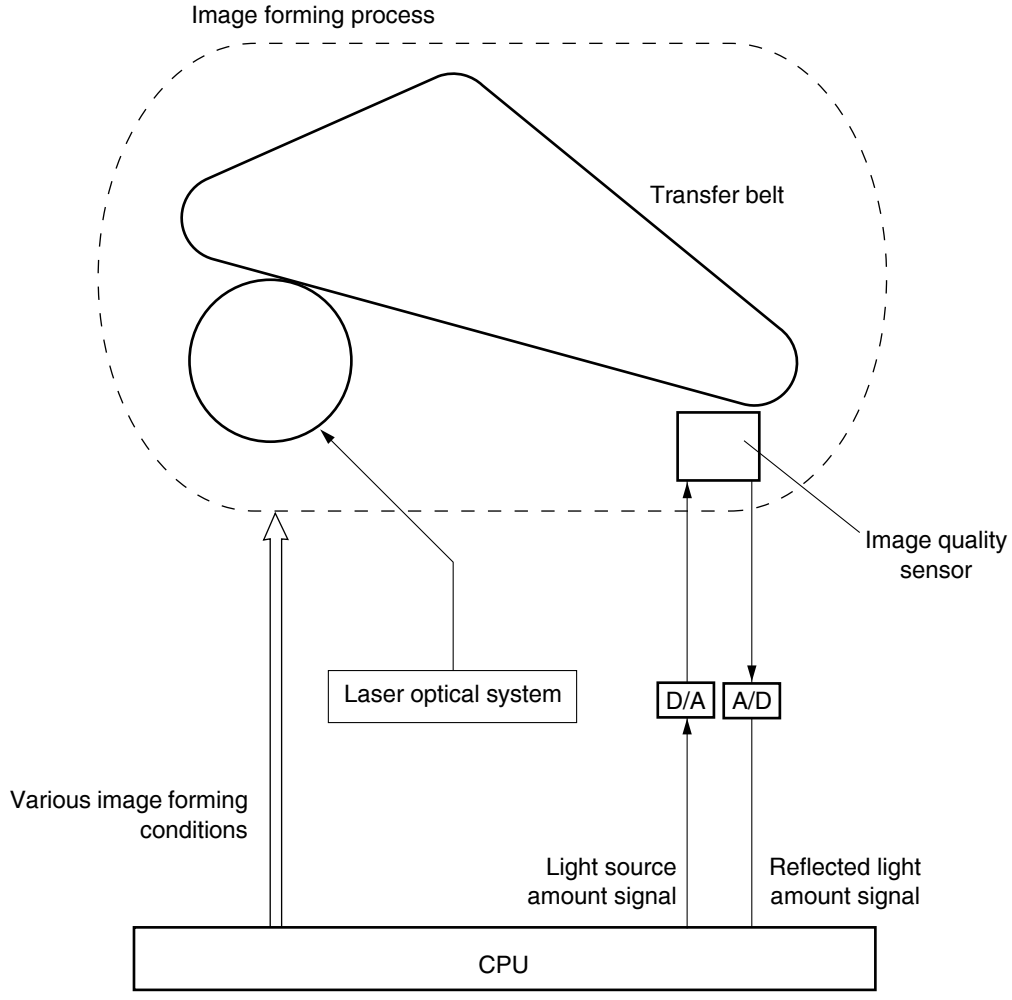


Fig. 15-401

15.5 Disassembly and Replacement

[A] Image quality sensor / Image quality sensor shutter solenoid

(1) Take off the fuser unit (► Chapter 16.7 [A]). Take off the transfer belt unit (► Chapter 14.7 [A]).

(2) Open the 2nd transfer cover. Remove 2 screws and disconnect 2 connectors. Take off the image quality sensor assembly.

Note: Insert latches of sensor case to the hole of the plate securely when installing.

(3) Remove 2 screws and take off the image quality sensor.

(4) Remove 2 screws and take off the image quality sensor shutter solenoid.

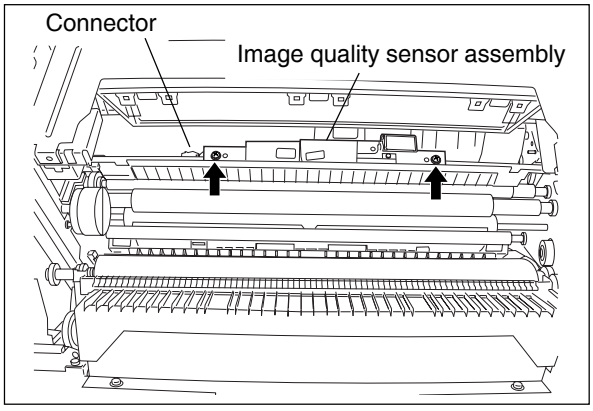


Fig. 15-501

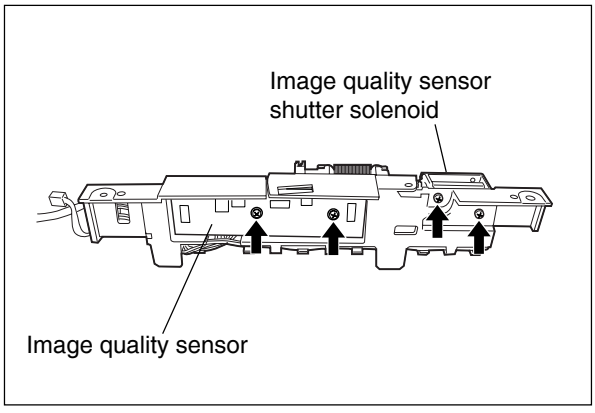


Fig. 15-502

16. FUSER UNIT / PAPER EXIT SECTION

16.1 General Description

Toner is fused by applying heat and pressure on the transferred image on the paper which is transported to the fuser unit. The paper is then transported to the receiving tray, paper exiting options or ADU. The fuser unit consists of the IH coil, fuser roller, pressure roller, fuser belt, separation roller, separation fingers, separation plate, cleaning roller, oil roller, thermistors, thermostat, exit roller, exit sensor, etc.

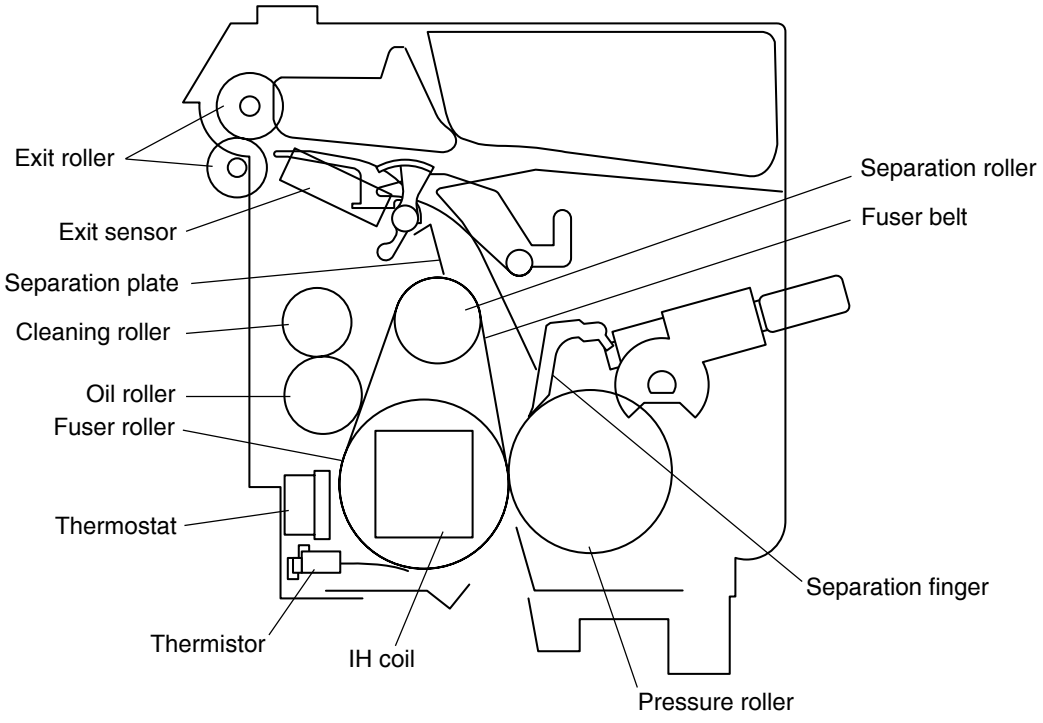


Fig. 16-101

16.2 Operation

The fuser belt is located between the fuser roller and pressure roller. The fuser roller is pressed with the spring force from the pressure roller side, and it is rotated by the transport motor drive. The fuser belt also rotates simultaneously. Then the paper transported to the fuser unit is hold between the fuser belt and pressure roller and the toner is fused on the paper with heat and pressure. After this, the separation fingers, belt separation mechanism and separation plate separate the paper from the fuser belt. Then the paper is transported to the receiving tray, paper exiting options or ADU through the exit roller. In addition, the IH coil in the fuser roller does not structurally rotate.

The thermistors control the temperature of fuser roller and detect temperature abnormalities. If the temperature becomes excessively high, the thermostat is opened to stop the power supply to the IH coil.

When transporting OHP film or thick paper in color modes, the transport speed is lowered to the range from 1/2 to 1/4 in order to improve fusing efficiency. The exit motor which drives the exit roller is decelerated at the same time.

16.3 Functions

(1) IH coil (IH: Induction Heating)

The IH coil is inside the fuser roller and applies the induction heating to the fuser roller. This IH coil is divided into two parts; the main IH coil heating the center of the fuser roller and the sub IH coil heating both ends of the fuser roller. Each part turns ON/OFF individually controlling the balance of electric supply so that the fuser roller can be kept at a certain temperature without wasting electric power on any paper size.

(2) Fuser roller

The fuser roller is a metal roller which generates heat spontaneously with eddy current produced by the electromagnetic induction of IH coil. The fuser belt is heated by this self-heating of this roller, and then the toner is fused on the paper.

(3) Pressure roller

The pressure roller is a sponge roller which assures the nip amount between the fuser roller and fuser belt. The pressure arm and spring press the fuser roller and fuser belt.

The toner is fused effectively by the pressure of this roller.

(4) Fuser belt

The fuser belt is hanged up between the fuser roller and separation roller and fuses the toner image on the paper transported by being heated.

The thin fuser belt enables to reduce warming up time and mode changing time. To prevent the fuser belt from adhering toner, the surface of the fuser belt is fluorinated.

(5) Separation roller

The separation roller is an extra small ceramic roller coated with the fluororesin tube. When the fuser belt is tensed and driven by the separation roller, the fuser roller drives the fuser belt and the paper between the fuser belt and pressure roller is separated from the fuser belt (belt separation method).

(6) Separation fingers

Five separation fingers are installed above the pressure roller to separate the paper stuck on the pressure roller.

(7) Separation plate

The separation plate is installed above the separation roller to cover the insufficient separation often occurs at color printing - the mode that the toner is much adhered.

(8) Cleaning roller / Oil roller

Silicone oil is contained inside of the oil roller to supply a proper amount of oil to the fuser belt, and this enables to remove the residual toner and paper dust (preventing offsetting phenomenon). Also, the cleaning roller is a fluorinated aluminum roller which removes the residual toner and paper dust adhered on the oil roller.

(9) Main thermistor/Sub thermistor

This thermistor detects the temperature of the fuser belt to maintain it in a certain temperature range (actually around 180°C) between the lower limit causing the poor fusing and the upper limit causing the high temperature offsetting. When the temperature of the fuser belt is lower than the preset temperature, it turns ON the power supply to the IH coil, and when it is higher than the preset temperature, it cuts off the supply. The main thermistor detects the temperature of the center part of the fuser belt and the sub thermistor detects the temperature of the both ends of the fuser belt. It also detects the slight difference of the temperatures at the center and both ends of the fuser belt to control the balance of ON/OFF of the center/side parts of IH coil to keep the fuser belt at a certain temperature.

(10) Front edge thermistor

It detects the temperature abnormality at the both ends of the fuser belt. This area may be overheated without heat absorption by paper since paper does not pass through this area. This thermistor is not related to the temperature control of the fuser belt.

(11) Thermostat

The thermostat cuts off the power supply to the IH coil by opening itself if the fuser belt becomes abnormally hot as a result of the problem such as thermistor malfunction. The thermostat for this equipment is used to prevent abnormal operation. When the thermostat detects any abnormality, it must be replaced as well as the other damaged parts in the fuser unit.

(12) Exit sensor

This sensor detects the arrival of the leading or trailing edge of the paper at the exit roller of the fuser unit. It also detects paper jams in the fuser unit paper exit section and trailing edge of paper turned over for duplex printing.

(13) Exit motor

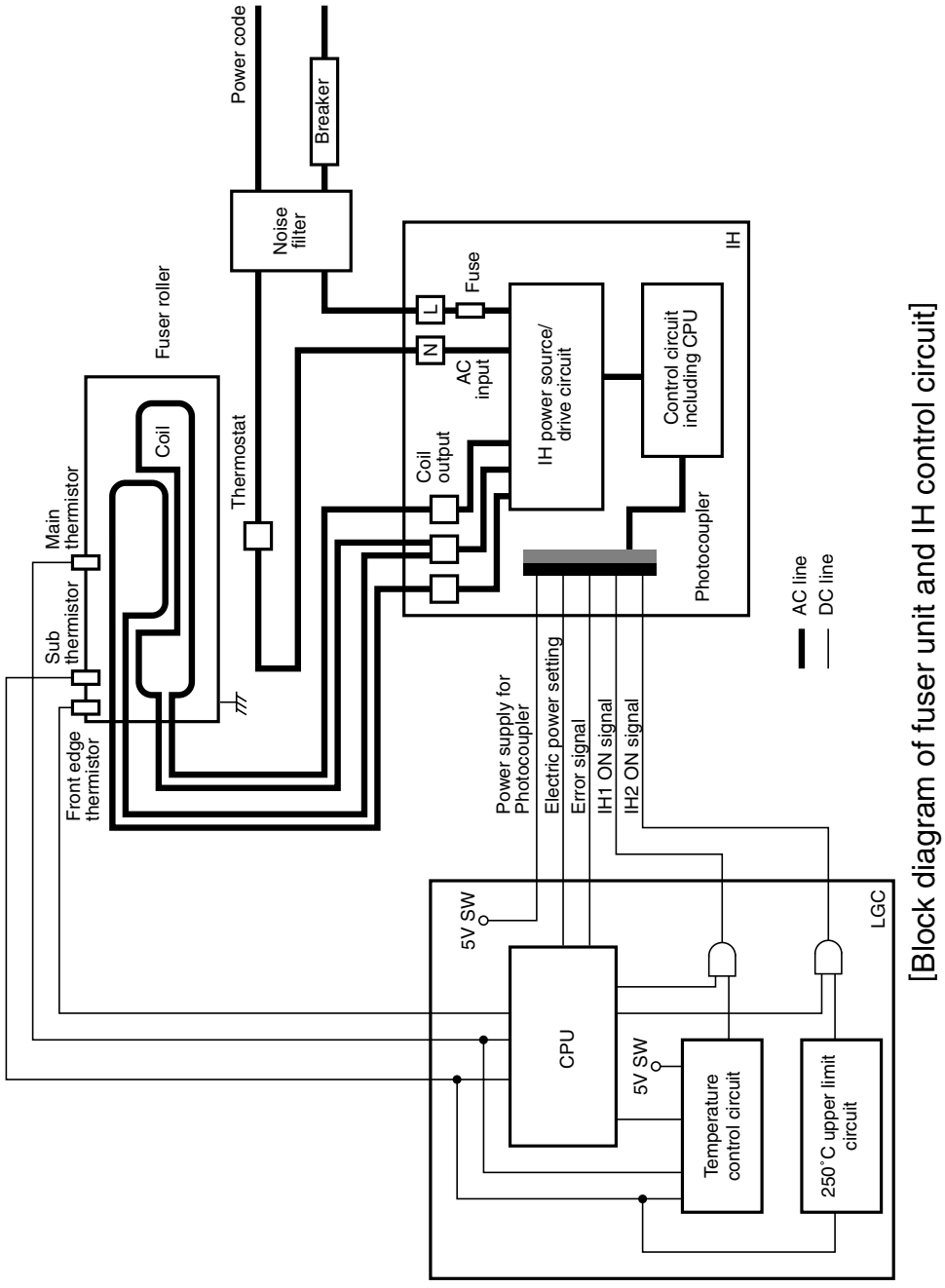
The exit motor is a stepping motor which drives the exit roller and bridge unit (option). It reduces the transport speed down to the range from 1/2 to 1/4 according to the type of paper such as OHP film or thick paper in color modes.

(14) Exit roller

This roller transports the paper from the fusing section to the receiving tray, paper exiting options or the ADU and is driven by the exit motor.

16.4 Heater Control Circuit

16.4.1 Configuration



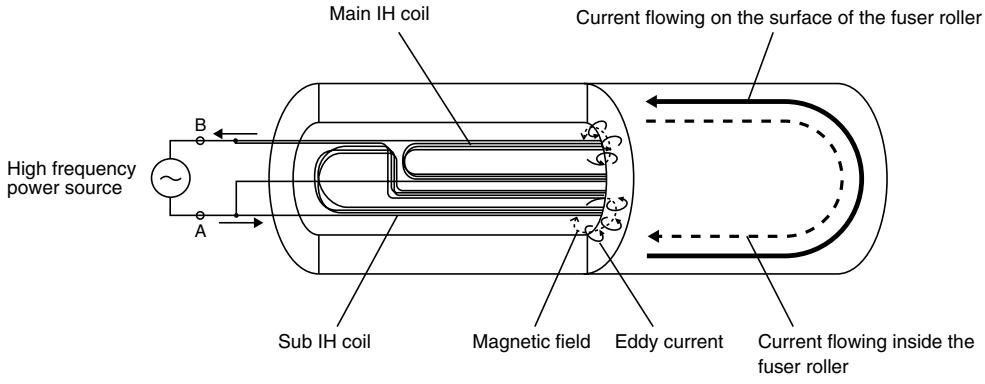
[Block diagram of fuser unit and IH control circuit]

Fig. 16-401

16.4.2 Heating principle of IH Heater

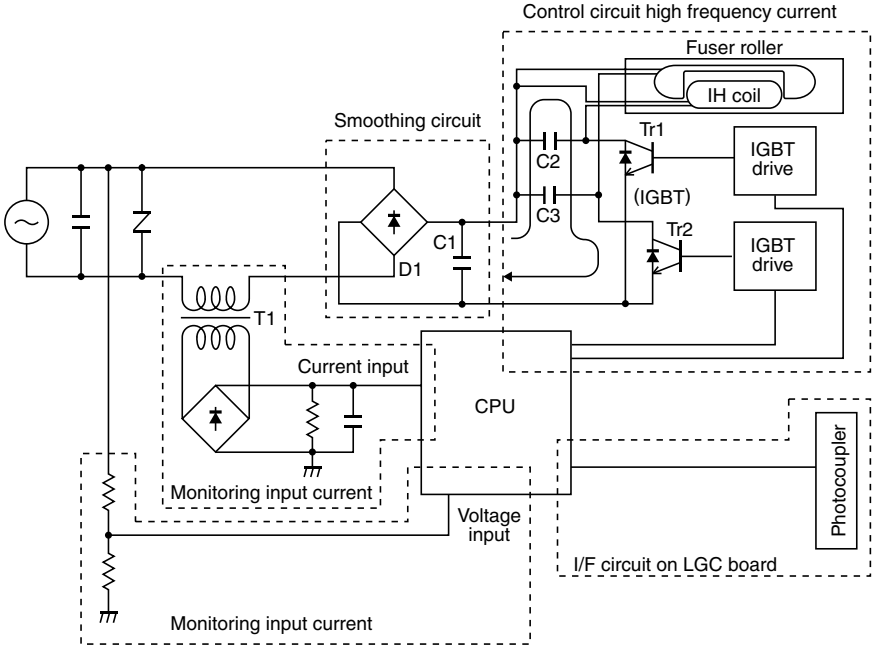
The magnetic field is generated by applying a high frequency current to the IH coil inside the fuser roller, which then generates the eddy current in it. When the eddy current flows, the Joule heat is generated by the resistance element of the fuser roller, which is then heated. In the IH coil method, the thermal efficiency is higher than the lamp method because the fuser roller is directly heated.

IH coil is divided into two parts to decrease the temperature difference between the center and both ends of the fuser roller.



[Image of Current Flowing form A to B]

Fig. 16-402



[Book Diagram of High Frequency Power Supply]

Fig. 16-403

16.4.3 IH control circuit interface

The IH control circuit uses a photocoupler as an insulation against the secondary circuit.

The interface signals are as follows.

CN No.	Name of single	Direction	Definition
CN455-2	+5VSW		
CN455-3	H1PWR1	LGC to IH	Switching signal of power setting
CN455-4	H1PWR2		
CN455-5	H1PWR3		
CN455-6	H2PWR1		
CN455-7	H2PWR2		
CN455-8	H2PWR3		
CN455-1	IH2 ON	LGC to IH	IH coil energization permitting signal
CN456-1	IH1 ON		
CN456-4	H1ERR1	IH to LGC	IH status signal (*Note)
CN456-5	H1ERR2		
CN456-2	SG		
CN456-3	IHDUTY	LGC to IT	Main/sub switching signal

(*Note) IH status signal

- When the temperature (due to insufficient cooling) of the switching element (IGBT) is abnormal:
  "12: Coil is abnormal, IH FAN OFF" → After a certain period of time → Error [C480]
- Main/sub coil continuous energization error (15 sec.): "12: Coil is abnormal, IH FAN OFF" → After a certain period of time → Error [C480]
- When the upper limit of the power voltage is abnormal:
  "10, 11, 14: Initializing" → After a certain period of time → Error [C470]
  "07: Ready" → After a certain period of time → Error [C470]
- When the lower limit of the power voltage is abnormal:
  "10, 11, 14: Initializing" → After a certain period of time → Error [C470]
  "07: Ready" → After a certain period of time → Error [C470]
- Defective circuits →: "13: Abnormal circuit, IH coil abnormality" → Error [C490]
- Ready state after the initialization: "01: Ready"

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16.4.4 Relation between system configuration and IH output

for NAD, SAD, TWD:

<table>
<tr><th>System configuration</th><th>Warming up (*2)</th><th>Ready</th><th>Printing</th><th>Energy saving mode</th><th>Automatically OFF</th><th>Warming up time</th></tr>
<tr><td>Equipment only</td><td rowspan="2">1160-1300W</td><td rowspan="6">800W</td><td>1080W</td><td rowspan="6">800W</td><td rowspan="6">OFF</td><td rowspan="6">Approx 40 sec.</td></tr>
<tr><td>Equipment and RADF (*1)</td><td>1020W</td></tr>
<tr><td>Equipment, RADF (*1) and FIN</td><td rowspan="2">1160-1260W</td><td rowspan="2">960W</td></tr>
<tr><td>Equipment, RADF (*1), FIN, and HPU</td></tr>
<tr><td>Equipment, RADF (*1), FIN, HPU and LCF</td><td rowspan="2">1140-1240W</td><td rowspan="2">940W</td></tr>
<tr><td>Equipment, RADF (*1), FIN, HPU, LCF and FAX</td></tr>
</table>

for ASD, AUD, CND:

<table>
<tr><th>System configuration</th><th>Warming up (*2)</th><th>Ready</th><th>Printing</th><th>Energy saving mode</th><th>Automatically OFF</th><th>Warming up time</th></tr>
<tr><td>Equipment only</td><td rowspan="2">1160-1300W</td><td rowspan="6">700W</td><td>1240W</td><td rowspan="6">700W</td><td rowspan="6">OFF</td><td rowspan="6">Approx 40 sec.</td></tr>
<tr><td>Equipment and RADF (*1)</td><td>1180W</td></tr>
<tr><td>Equipment, RADF (*1) and FIN</td><td rowspan="2">1160-1260W</td><td rowspan="2">1120W</td></tr>
<tr><td>Equipment, RADF (*1), FIN, and HPU</td></tr>
<tr><td>Equipment, RADF (*1), FIN, HPU and LCF</td><td rowspan="2">1140-1240W</td><td rowspan="2">1100W</td></tr>
<tr><td>Equipment, RADF (*1), FIN, HPU, LCF and FAX</td></tr>
</table>

* RADF: Reversing automatic document feeder, FIN: Finisher, HPU: Hole punch unit, LCF: Large capacity feeder, FAX: FAX unit

(*1) The wattage lowers 50 W more when the scanning is performed from the RADF during warming up.

(*2) AC power should be input voltage when the equipment is warming up (The lower the voltage is, the longer the warming up time becomes).

16.4.5 Temperature detection section

To maintain the stable temperature of the fuser belt, the thermistor detects the temperature and controls ON/OFF of the IH coil. Output from the thermistors is used to detect the abnormality.

(1) Relation between the thermistor output voltage and surface temperature of the fuser belt:

Output voltages of thermistors [V]	Surface temperatures of fuser belt [°C]
Approx. 0.30	40
Approx. 1.77	100
Approx. 3.28	150
Approx. 3.66	170
Approx. 3.81	180
Approx. 4.03	200

(2) Control of the surface temperature of the fuser belt:

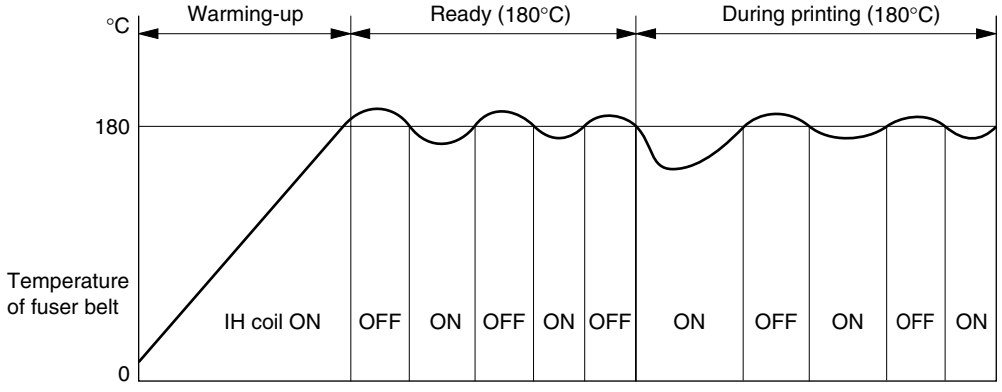

Fig. 16-404

(3) Temperature control for the both ends of the fuser belt

During the continuous printing, the temperature of the both ends of the fuser belt (areas where the paper does not pass on) generally tend to be higher than that of the other areas (areas where the paper passes on). The temperature of the ends are detected by the front edge thermistor, and when it reaches 250°C, the heater is automatically turned OFF regardless of the temperature of the area where the paper passes on.

(4) Temperature control at energy saving mode

This equipment has the following two types of temperature control for saving energy and returns to ready status to perform printing in each mode upon printing request.

The period of time from the printing request to this mode can be set in the Setting Mode (08) or by an from administrator.

Administrator setting procedure:

[USER FUNCTIONS] button → [ADMIN] (input of administrator's password) → [GENERAL] → [ENERGY SAVER]

Auto Power Save Mode (Setting Mode (08-205)):

When the printing is not performed in a specified period of time (default setting: 15 min.) after the previous printing is completed, the equipment enters to Auto Power Save Mode. ON/OFF of IH coil is controlled to maintain the fuser belt surface temperature at 100°C.

Auto Shut Off Mode (Setting Mode (08-206)):

When the printing is not performed in a specified period of time (default setting: e-STUDIO3511: 60 min. / e-STUDIO4511: 90 min.) after the equipment entered to Auto Power Save Mode, the equipment then enters to Auto Shut Off Mode to turn OFF the IH coil.

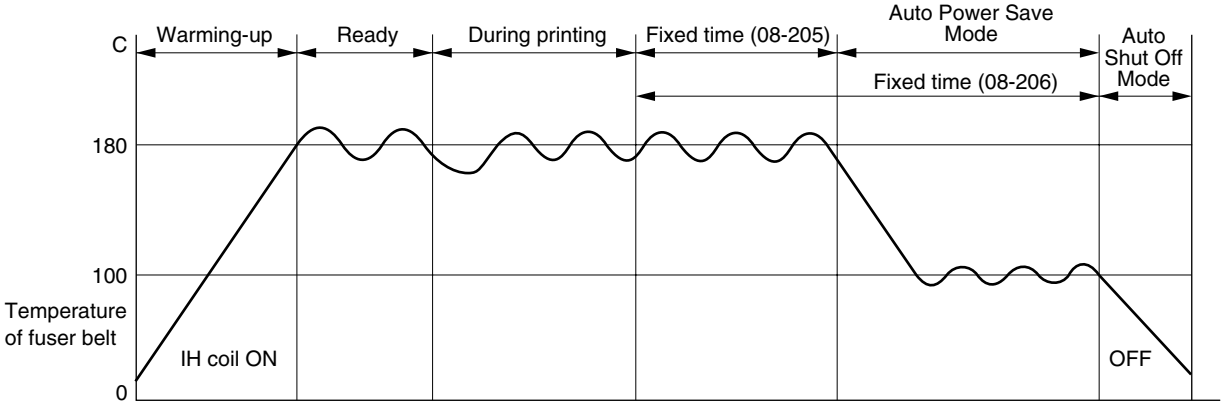

Fig. 16-405

(5) Thermistor/heater status counter control

- To enhance the safety of the fusing section unit, CPU provides the following protection: When the third [C410] error has occurred after two consecutive [C410] errors, the IH coil is not turned ON and error [C410] is displayed immediately even if an operator turns OFF the power and back ON. However, if the equipment goes into a ready state normally with the thermistor/heater status counter "1" or below, the counter is cleared to "0".
- If the error codes [C410] to [C450] are displayed and still not cleared even thought the thermistor, thermostat and IH coil have been repaired (and the power ON/OFF does not clear the error), check the Setting Mode (08-400) to set the thermistor/heater status counter to "0".

Reference

* The thermistor/heater status counter never has values other than 0 to 19.

- If the IH coil does not turn ON and the service call [C410] is displayed immediately after the power is ON, ensure the thermistor/heater status counter is "2" or over. If it is "2" or over, be sure to check the thermistor, thermostat and IH coil. Reset the counter to "0" (setting mode (08-400)) after repairing them, then turn ON the power.
- If the thermistor/heater status counter is "20" or over (e.g., 21), the data in NV RAM or NV RAM itself may possibly have been ruined due to causes such as leakage from the chargers. Check the bias, high-voltage transformers and charge wires to see if any of them is defective, and also look through all the data in the NV RAM.

(6) Temperature detection configuration

Thermistor is a device whose resistance decreases as it detects a higher temperature. Thus its input voltage to CPU changes and then CPU judges whether this change is normal or abnormal. If one of the fuser belt thermistors is broken, the control circuit judges that the fuser belt temperature is extremely low and keeps turning the IH coil ON. As a result, the fuser belt temperature rises, and possibly activates the thermostat which is a safety protection device. To prevent this in advance, CPU works to detect whether each thermistor is broken or not.

Also, the thermistors constantly check the temperature of IH coil to prevent it from excessive heating by IH circuit abnormality, LGC circuit abnormality or thermistor abnormality. The thermistors automatically turn OFF the power when the temperature of IH coil exceeds the specified temperature.

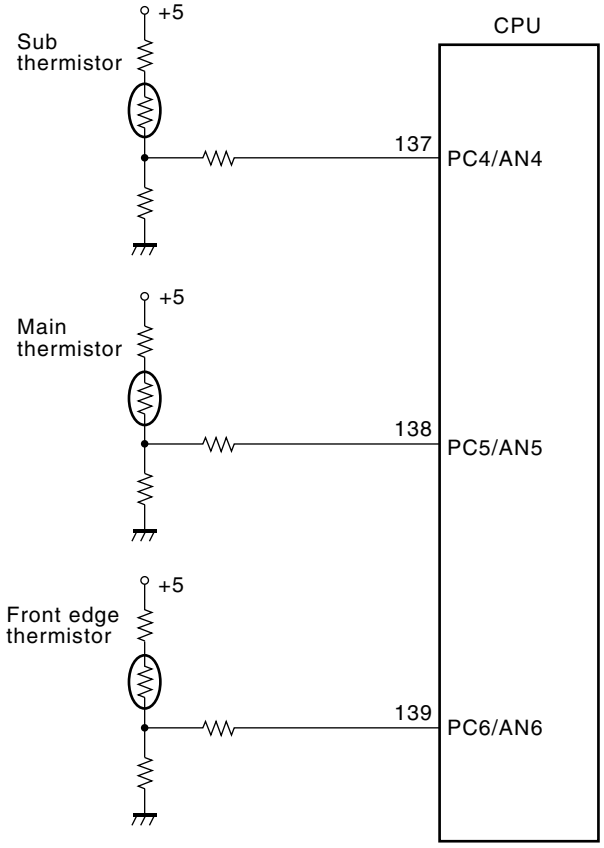

Fig. 16-406

(7) Abnormality detection by the thermistors

The following table shows the conditions judging the fuser belt temperature abnormality and detecting timing.

Checking timing	Condition	Temperature judged			Checking timing	Error code
		Main thermistor	Sub thermistor	Front edge thermistor		
Power ON	1	250°C or above	-	-	Power ON	C440
		-	250°C or above	-		
	2	40°C or below	150°C or above	-		C410
		150°C or above	40°C or below	-		
Detecting 40°C	1	250°C or above	-	-	Fixed time	C440
		-	250°C or above	-		
	2	40°C or below	-	-		C410
		-	40°C or below	-		
Detecting 100°C	1	250°C or above	-	-	Fixed time	C440
		-	250°C or above	-		
		100°C or below	-	-		
		-	100°C or below	-		
	2	40°C or below	150°C or above	-		C430
		150°C or above	40°C or below	-		
Detecting 160°C	1	250°C or above	-	-	Fixed time	C440
		-	250°C or above	-		
		160°C or below	-	-		
		-	160°C or below	-		
	2	40°C or below	150°C or above	-		C430
		150°C or above	40°C or below	-		
Detecting ready temperature	1	250°C or above	-	-	Fixed time	C440
		-	250°C or above	-		
		Ready temp. or below	-	-		
		-	Ready temp. or below	-		
	2	40°C or below	160°C or above	-		C430
		160°C or above	40°C or below	-		
During ready status At energy saving mode	1	250°C or above	-	-	On usual	C440
		-	250°C or above	-		
		40°C or below	-	-		
		-	40°C or below	-		
	2	40°C or below	160°C or above	-		C430
		160°C or above	40°C or below	-		
During printing	1	250°C or above	-	-	On usual	C440
		-	250°C or above	-		
		-	-	250°C or above		
		40°C or below	-	-		
		-	40°C or below	-		
	2	-	-	40°C or below		C450
At paper jam	1	250°C or above	-	-	On usual	C440
	2	-	250°C or above	-		

* Condtion: Priority of error checking.

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16.4.6 Abnormality in the IH control circuit

When an abnormality is detected in the IH control circuit, it stops the power supply to the IH coil and displays a message “Call for service”.

(1) IH control circuit

CPU output level of the IH control circuit changes depending on the condition of IH coil. This output level goes through the photocoupler into the gate array.

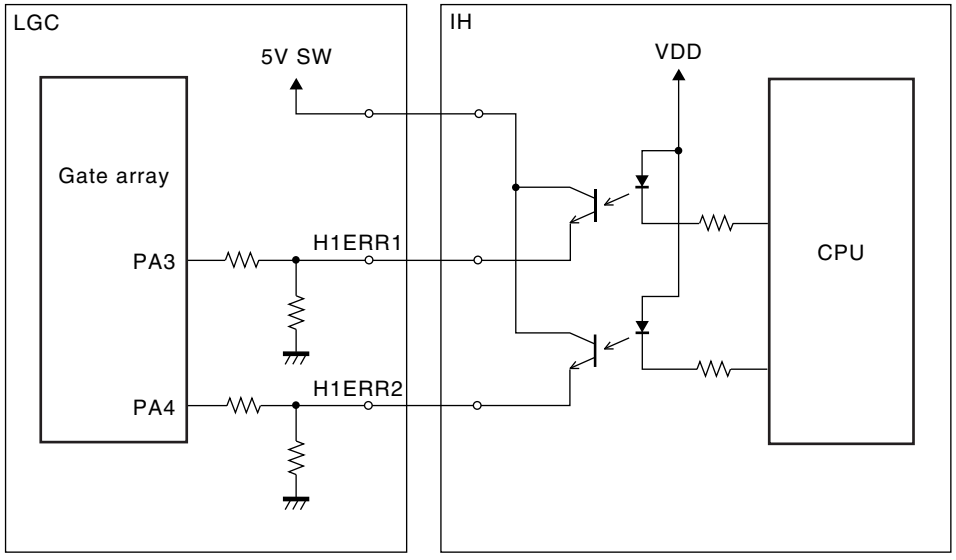

Fig. 16-407

(2) IH error

Checking timing	Error content	Port input value		Error code
		H1ERR1	H1ERR2	
Power ON	Initial abnormality	L	L	C470
In warming up	IH power voltage abnormality	L	L	C470
Detecting 40°C	IGBT high temperature abnormality / Continuous energization (15 sec.)	L	H	C480
	IH circuit/coil abnormality	H	H	C490
In warming up Detecting 40°C During ready status	IH power voltage abnormality	L	L	C470
	IGBT high temperature abnormality / Continuous energization (15 sec.)	L	H	C480
	IH circuit/coil abnormality	H	H	C490
During ready status During printing At Energy Saving Mode	IH power voltage abnormality	L	L	C470
	IGBT high temperature abnormality / Continuous energization (15 sec.)	L	H	C480
	IH circuit/coil abnormality	H	H	C490
	Normal	H	L	-

Initial abnormality:
CPU (IH) abnormality is not cleared.

IH power voltage abnormality:
The input voltage becomes above 20% (approx.) or below 20% (approx.) of the rated voltage.

IGBT high temperature abnormality:
Overheating of IGBT or short- or open-circuit of IGBT temperature-detecting sensor.

IH circuit abnormality:
Abnormality in IH circuit

IH coil abnormality:
Temperature-detecting sensor in IH circuit is abnormal, or IH coil is open-circuited or wrongly installed.

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16.5 Control Circuit of Exit Motor

The following is the control circuit of the exit motor.

The exit motor is a stepping motor. The motor is turned ON/OFF and the direction of its rotation is switched by controlling the output timing of pulse signal (A0·A1·B0·B1).

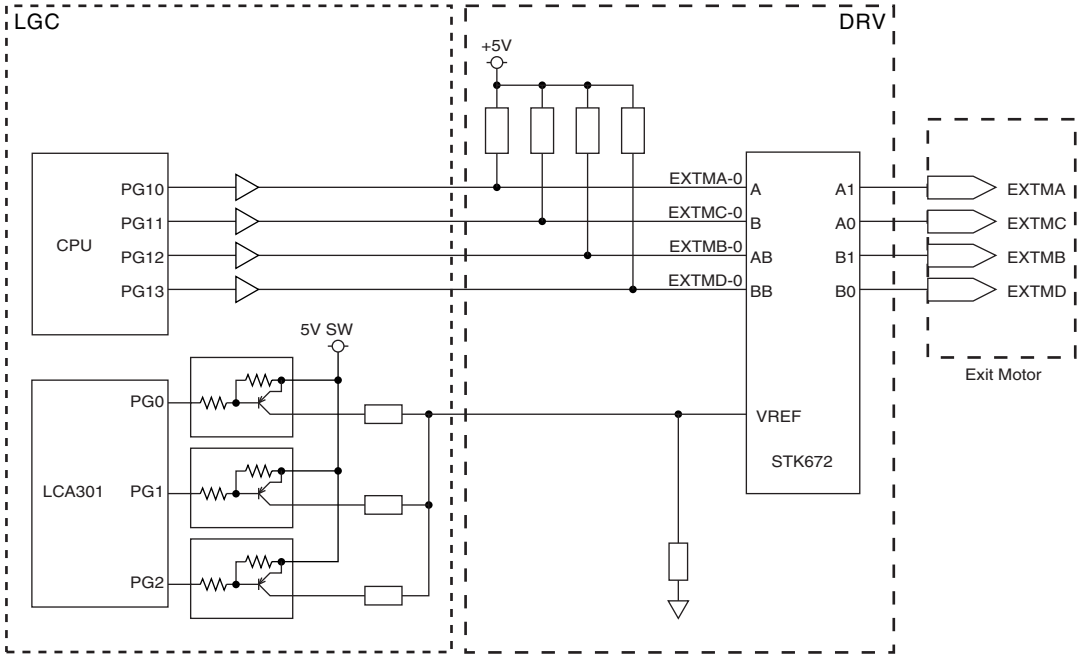

Fig. 16-501

16.6 Exit Motor Drive

The diagram shown below is the layout of the driving gears of the exit roller.

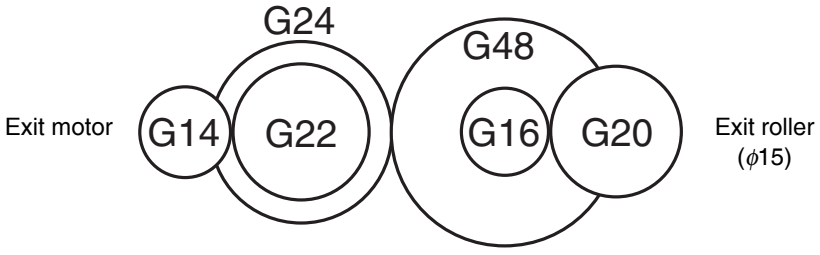

Fig. 16-601

16.7 Disassembly and Replacement

[A] Fuser unit

(1) Take off the IH terminal cover (► Chapter 2.5.1 [K])

(2) Disconnect 2 connectors and 4 faston terminals.

Notes: 1. Make sure to hold the plastic part of the faston terminals when disconnecting them.
2. Make sure not to connect each terminal to the wrong position.

(3) Remove 2 screws and take off the fuser unit.

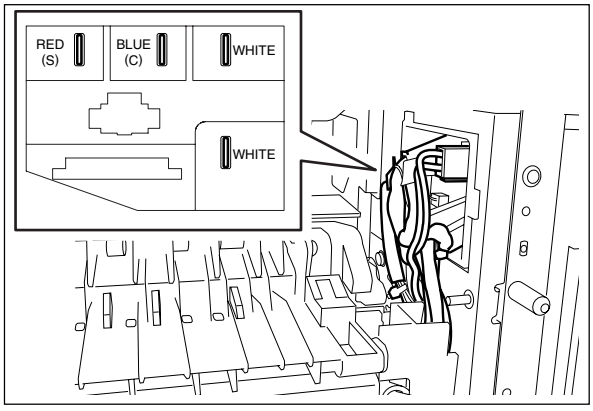

Fig. 16-701

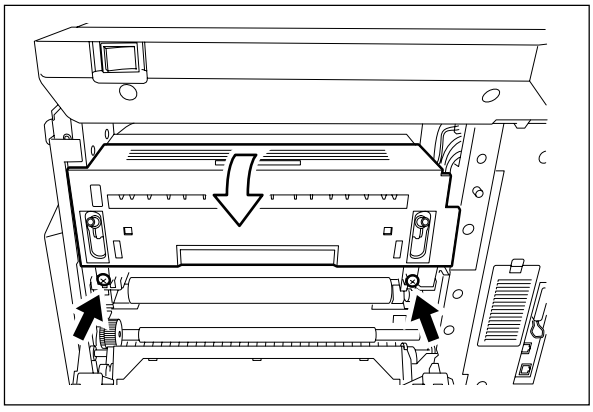

Fig. 16-702

[B] Oil roller PM

(1) Take off the fuser unit (► Chapter 16.7 [A]).

(2) Open the jam access cover and transport guide.

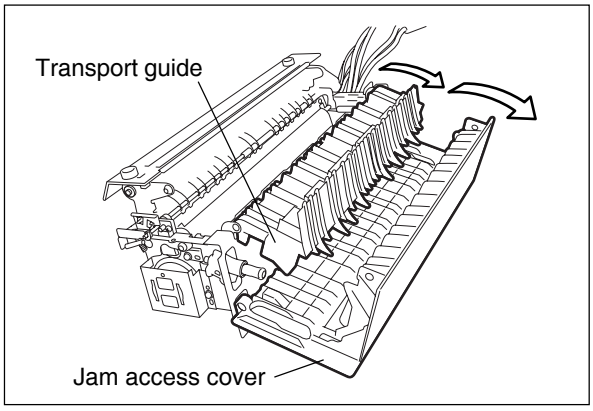

Fig. 16-703

(3) Remove 2 screws and take off the cleaning unit by lifting it up.

Note: When installing, fit 2 protrusions on the bottom of the cleaning unit into the holes of the frame securely.

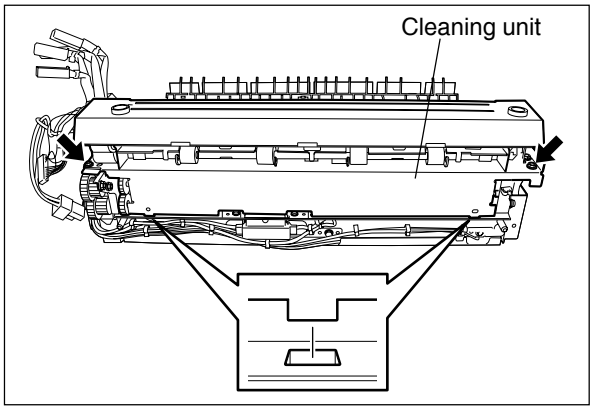

Fig. 16-704

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(4) Remove spring (B) on each end of the oil roller.
(5) Take off the oil roller.

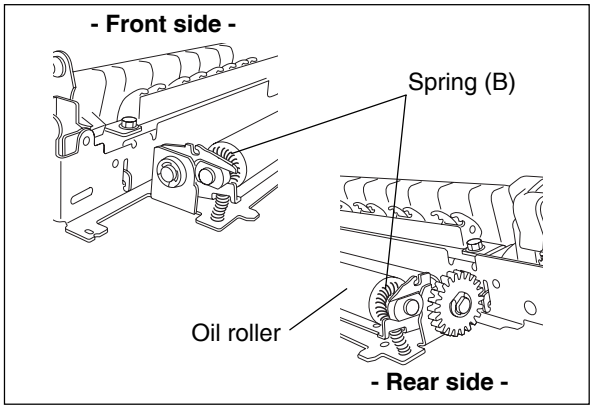

Fig. 16-705

(6) Remove 1 bushing from each side of the oil roller.

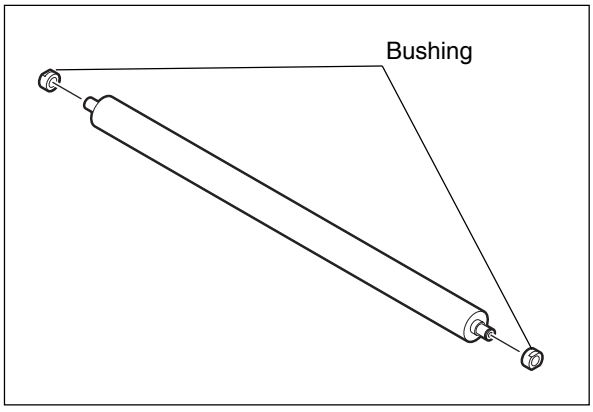

Fig. 16-706

Note: Install the oil roller according to the marking on the frame (the shaft end with a groove should point at the rear side).

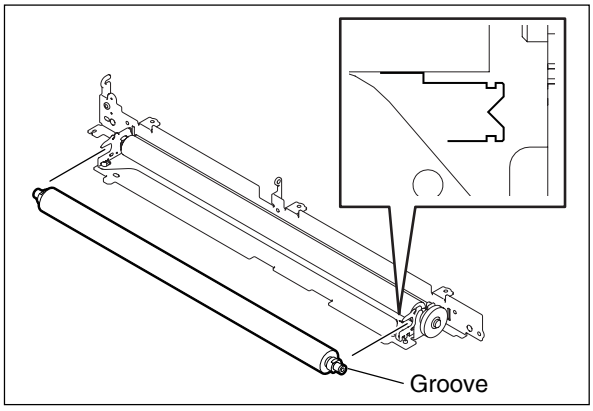

Fig. 16-707

[C] Cleaning roller PM

(1) Take off the oil roller from the cleaning unit (► Chapter 16.7 [B]).
(2) Remove 1 E-ring and 1 bushing from the cleaning roller front side. Then take off the cleaning roller.
(3) Remove the spring (A) on each end of the frame.

Note: When installing, make sure that the oil roller rotates smoothly by turning the gear (C) of the cleaning roller manually for a several times.

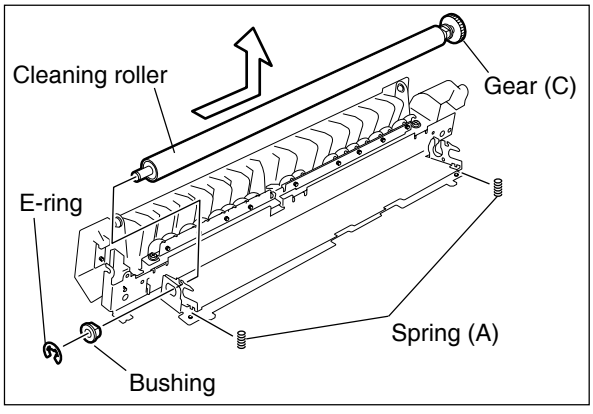

Fig. 16-708

(4) Remove 1 E-ring, the gear (C) and 1 bushing from the cleaning roller rear side.

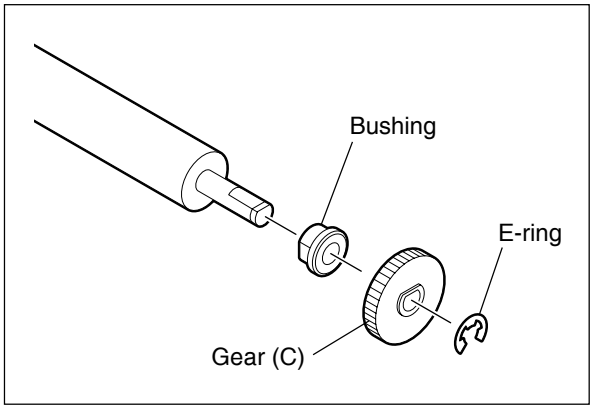

Fig. 16-709

[D] IH coil

(1) Take off the fuser unit (► Chapter 16.7 [A]).

(2) Release the harnesses from 5 harness clamps. Then remove 1 E-ring, 1 bushing and 2 screws.

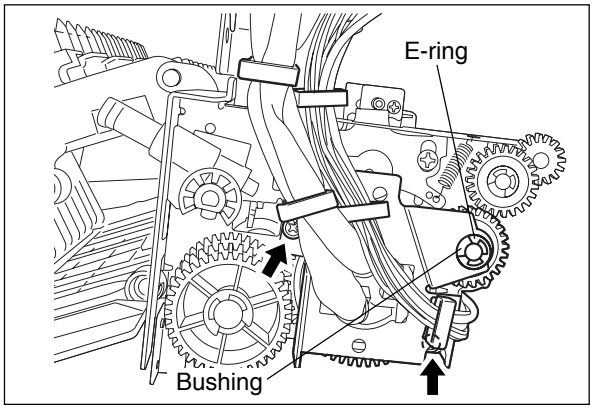

Fig. 16-710

(3) Pull out the bracket and IH coil.

(4) Take out the IH coil from the bracket.

Notes: 1. When installing, be sure to set the harnesses "C" and "S" of 4 harnesses on upper.

2. Make sure that there is not any scratch or break on the white tube on the IH coil.

3. Make sure that there is not any peeling or scratch on the harness tube.

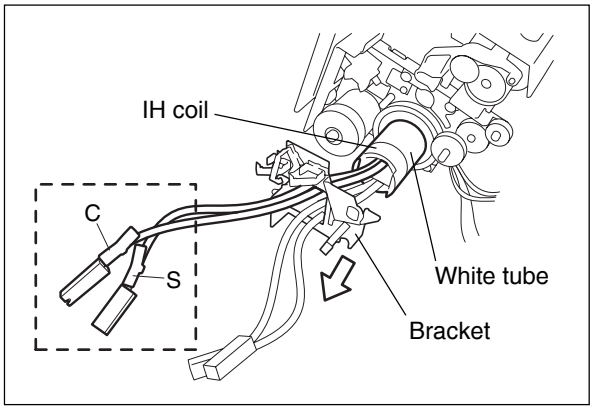

Fig. 16-711

[E] Fuser roller / Fuser belt guide PM

Note: When installing/disinstalling the fuser roller, make sure not to remove the spring (shown in the figure at right) since the removal of this spring may have the fuser roller press to deform the thermistor.

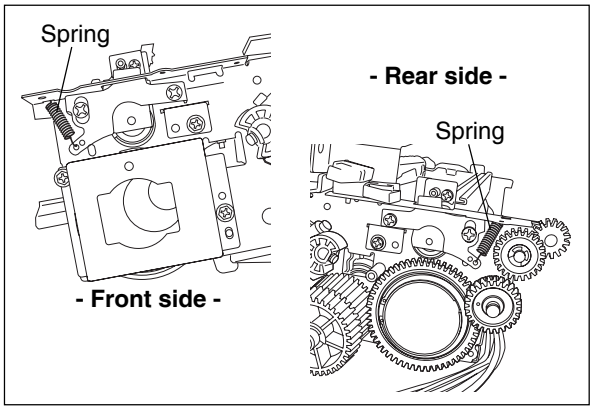

Fig. 16-712

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(1) Remove the cleaning unit (► Chapter 16.7 [B]).
(2) Remove the IH coil (► Chapter 16.7 [D]).
(3) Push down the pressure releasing levers on both sides.
(4) Remove 1 C-ring and 2 gears.

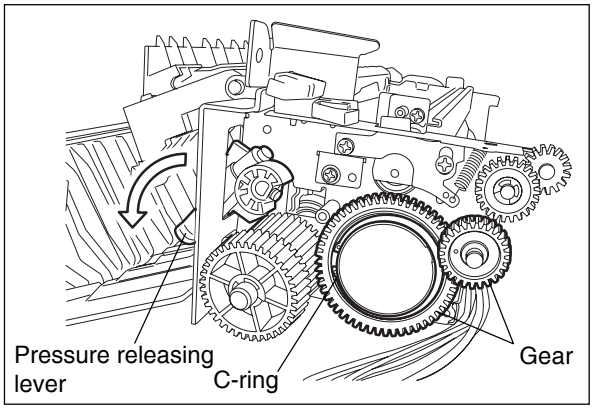

Fig. 16-713

(5) Remove 1 bearing.

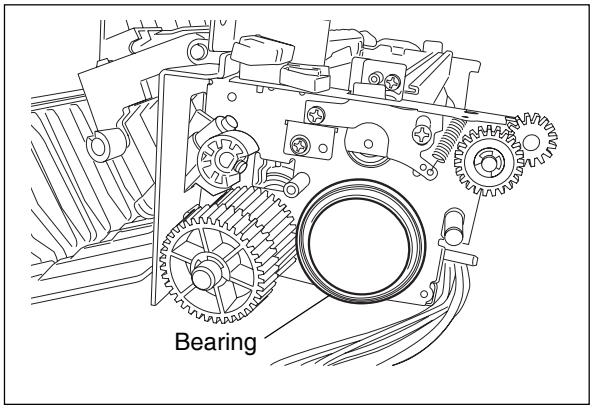

Fig. 16-714

(6) Insert a flat-head screwdriver into the slit of the fuser belt guide on the rear side. Then slide the plate while opening the slit by the flat-head screwdriver. Take off the fuser belt guide from the fuser roller.

Note: Be careful not to scratch the fuser belt.

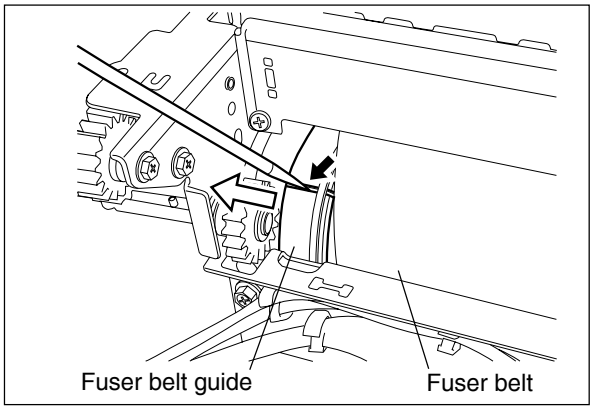

Fig. 16-715

(7) Remove 2 screws and take off the bracket.

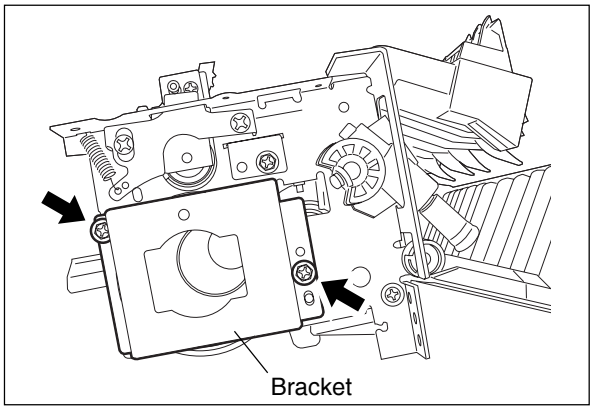

Fig. 16-716

(8) Take off the fuser roller.

(9) Remove 1 C-ring, 1 bearing and 1 fuser belt guide from the fuser roller front side.

Note: When installing, make sure that the fuser belt guide securely fits in the fuser roller groove. Also, make sure that the ring on the fuser belt guide securely fits in the groove on the belt restricting plate.

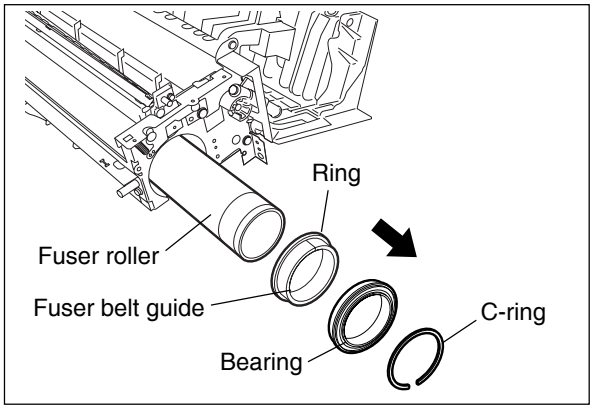

Fig. 16-717

[F] Fuser belt PM

(1) Take off the fuser roller (► Chapter 16.7 [E]).

(2) Lift up the fuser belt unit and take it off.

Note: Be careful not to scratch the fuser belt. Lay the fuser belt on the clean place to prevent the belt from the dust.

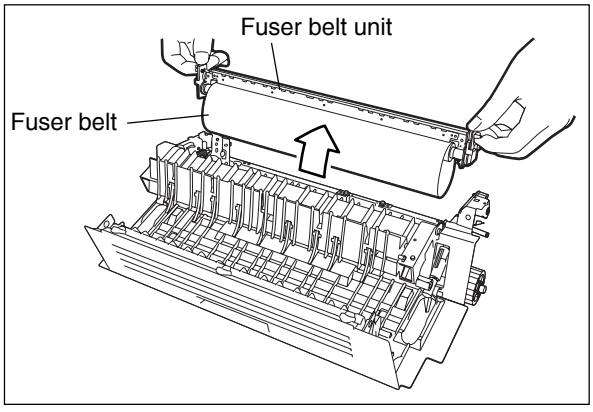

Fig. 16-718

(3) Remove 1 screw and take off the bracket on the front side.

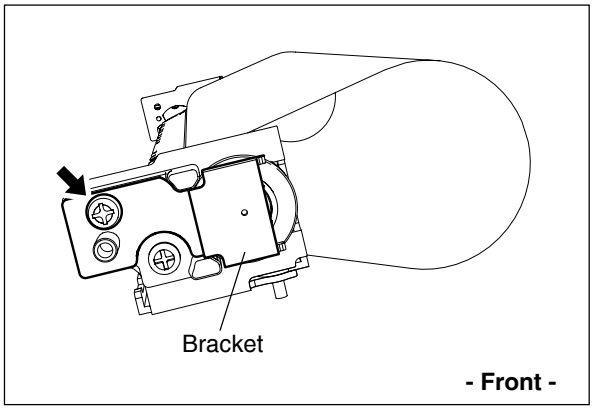

Fig. 16-719

(4) Remove 1 screw and take off the bracket on the rear side.

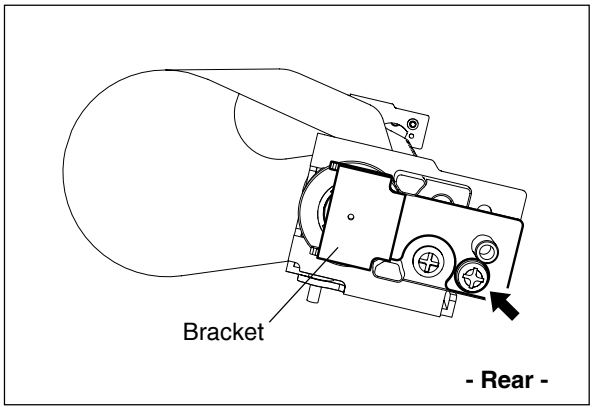

Fig. 16-720

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(5) Remove 1 E-ring. Then remove 1 bearing.

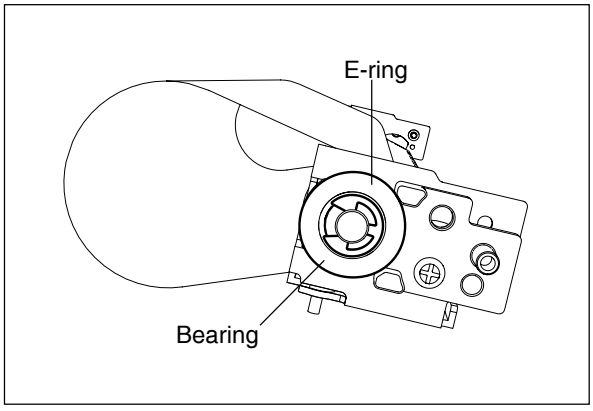

Fig. 16-721

(6) Lift up the separation roller by sliding it.
(7) Take off the fuser belt.

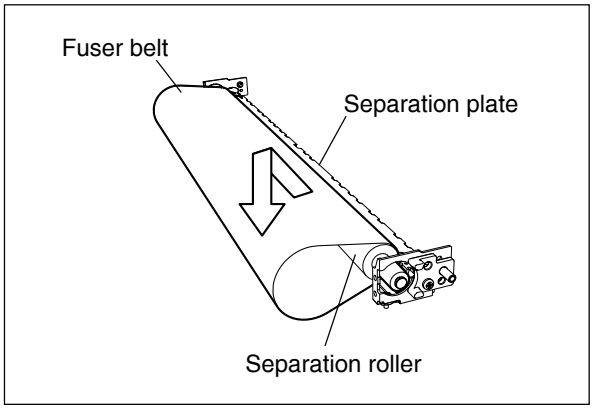

Fig. 16-722

Note: When installing the fuser belt, place a sheet of paper between the separation plate and fuser belt in order to prevent the fuser belt from being scratched by the separation plate. Keep the paper between then until the fuser roller is installed.

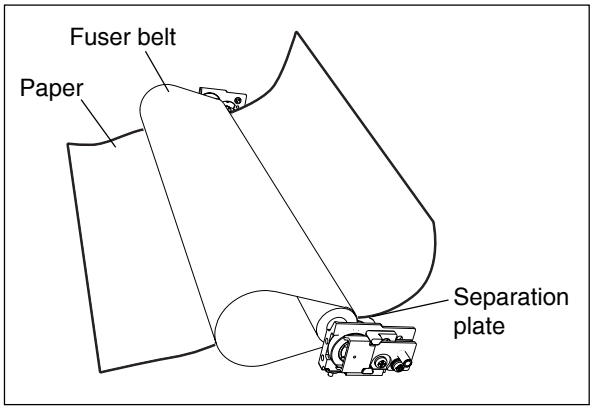

Fig. 16-723

[G] Separation finger

(1) Take off the fuser roller (► Chapter 16.7 [E]).
(2) Lift up the fuser belt unit and take it off.

Note: Be careful not to scratch the fuser belt. Lay the fuser belt on the clean place to prevent the belt from the dust.

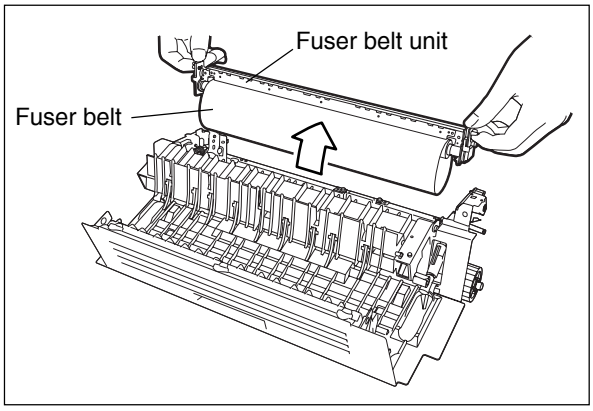

Fig. 16-724

(3) Confirm that the pressure releasing levers on both sides are up. Then loosen each 1 screw on both front and rear sides.

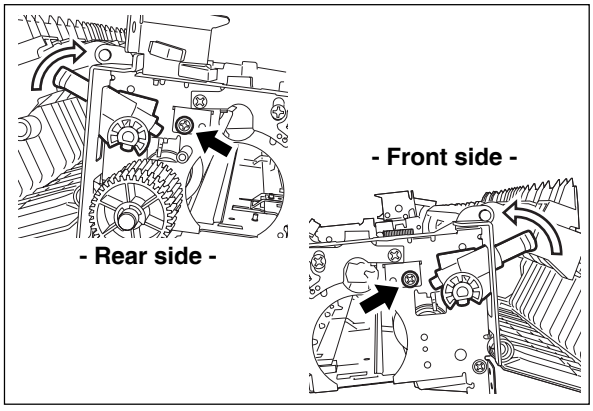

Fig. 16-725

(4) Remove 2 springs.

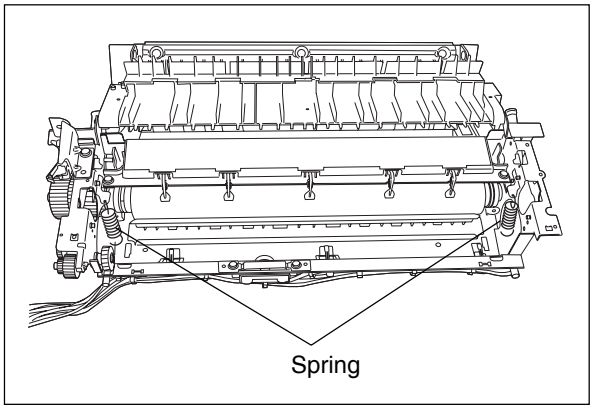

Fig. 16-726

(5) Remove 2 screws and take off the separation finger unit.

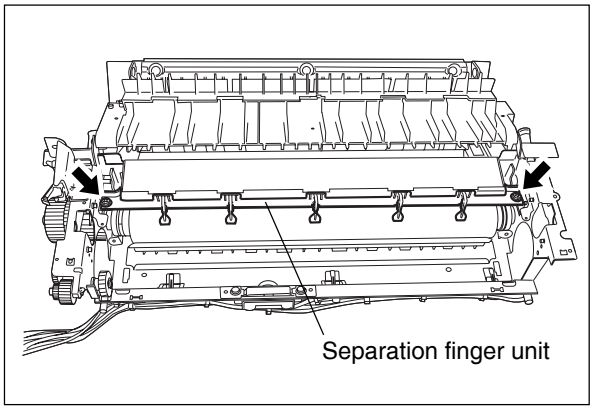

Fig. 16-727

(6) Remove the spring of each separation finger.

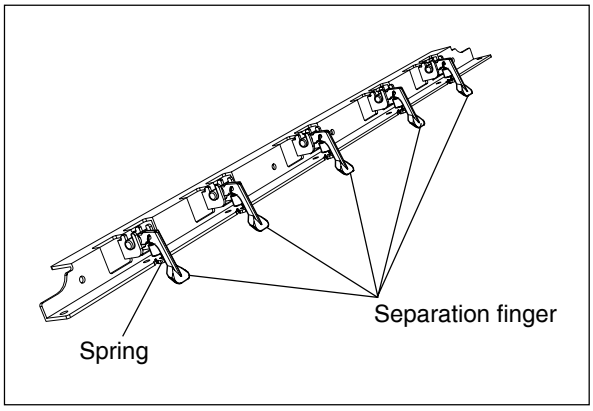

Fig. 16-728

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[H] Pressure roller (PM)

(1) Take off the fuser belt unit (► Chapter 16.7 [F]).
(2) Take off the separation finger unit (► Chapter 16.7 [G]).
(3) Take off the pressure roller.

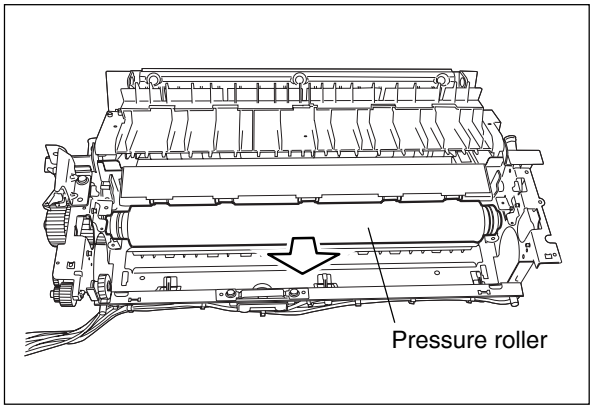

Fig. 16-729

(4) Remove each 1 ring, 1 bearing and 1 bushing on both front and rear sides of the pressure roller.

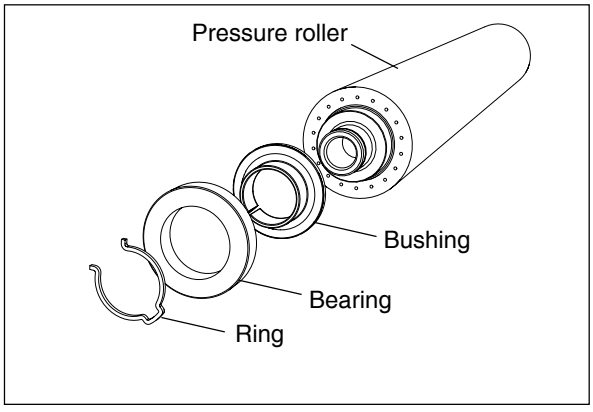

Fig. 16-730

[I] Thermostat

(1) Take off the fuser unit (► Chapter 16.7 [A]).
(2) Remove 2 screws. Lift up the cleaning unit and take it off.

Note: When installing, fit 2 protrusions on the bottom of the cleaning unit into the holes of the frame securely.

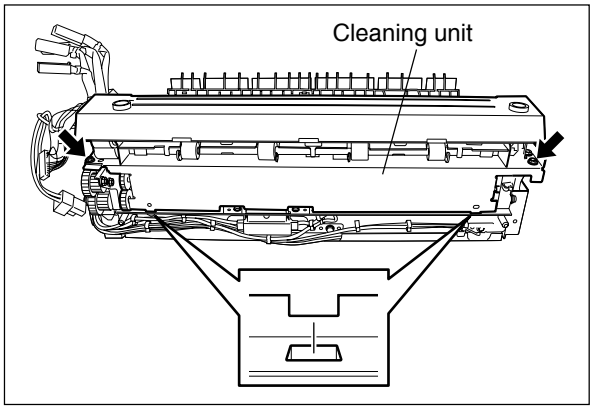

Fig. 16-731

(3) Release the harnesses from the harness clamps.
(4) Remove 2 screws and take off the thermostat unit.

Note: Be careful not to scratch the fuser belt.

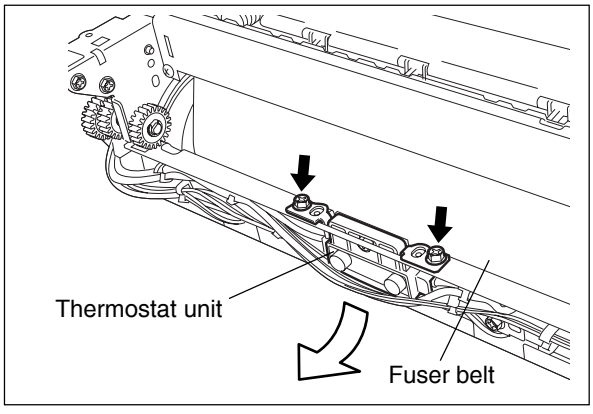

Fig. 16-732

16

(5) Remove 2 screws and take off the thermostat from the bracket.

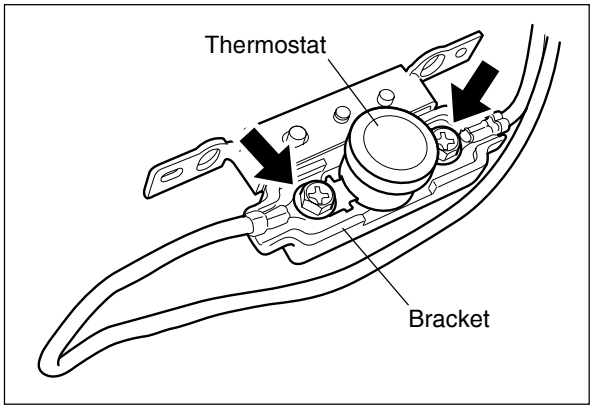

Fig. 16-733

Notes: When installing, pay attention to the followings:

1. Make sure to fix the thermostat, and then harness terminal in order on the bracket.
2. Make sure to keep the gap between the fuser roller and thermostat is 0.7 mm to 2.0 mm while the fuser roller is pressed to the pressure roller.

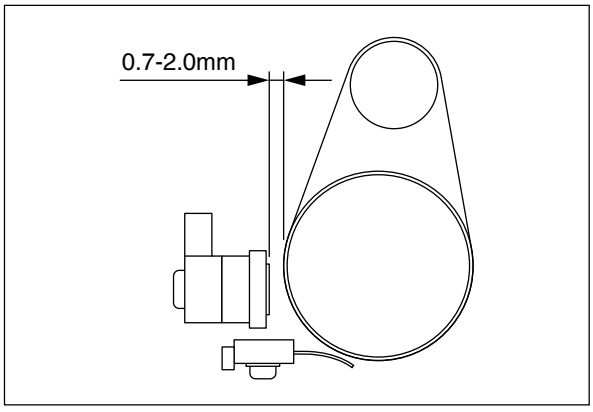

Fig. 16-734

[J] Thermistor

(1) Take off the fuser unit (► Chapter 16.7 [A]).

(2) Release the harnesses from the harness clamps.

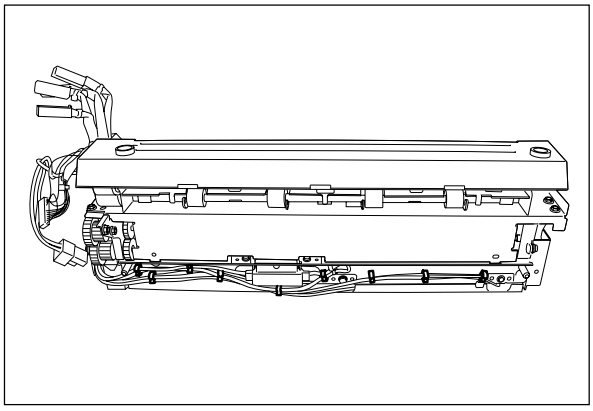

Fig. 16-735

(3) Remove 1 screw of each thermistor and take off total 3 thermistors.

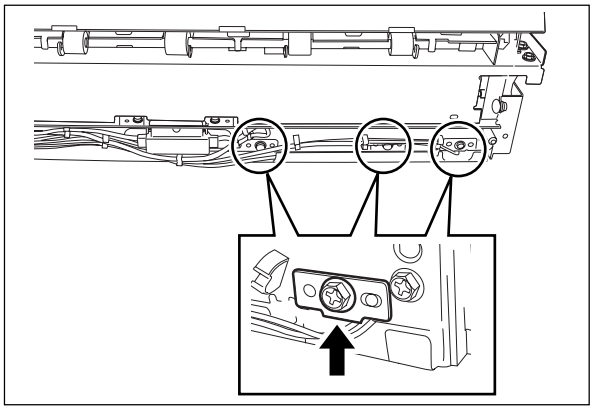

Fig. 16-736

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(4) Remove each 1 screw and take off the thermistor from each bracket.

Note: When installing, be careful not to deform the thermistor or the frame (plate). Also, make sure that the thermistor is in touch with the fuser belt.

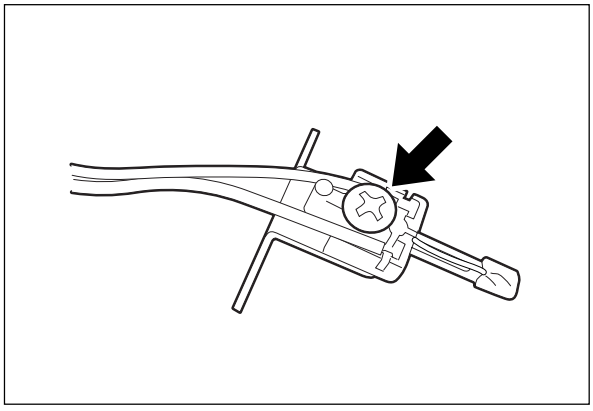


Fig. 16-737

[K] Exit sensor / Exit finger / Transport guide

(1) Take off the fuser unit (► Chapter 16.7 [A]).

(2) Open the jam access cover and transport guide.

(3) Remove 3 screws and take off the cover (A).

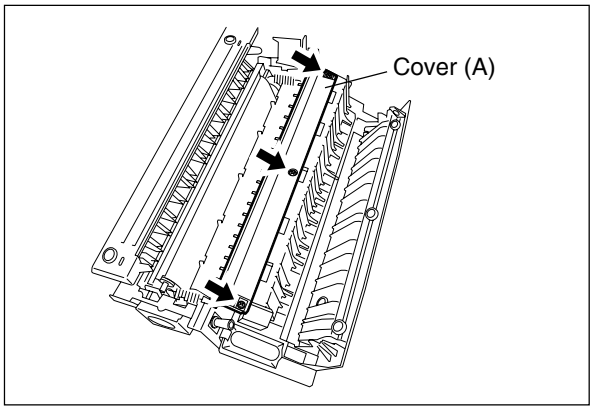


Fig. 16-738

(4) Remove 1 screw and plate spring.

(5) Disconnect 1 connector and take off the exit sensor.

(6) Remove 1 spring.

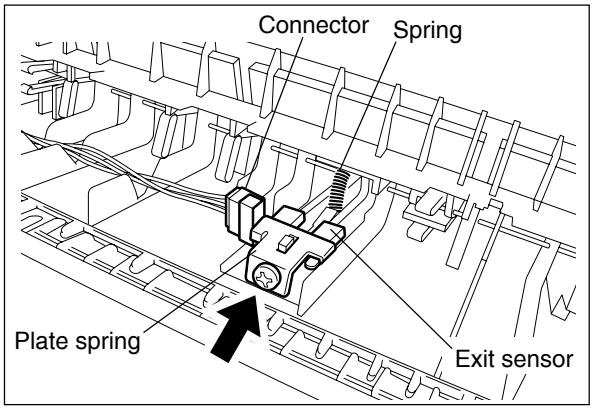


Fig. 16-739

(7) Remove 1 E-ring and pull out the shaft. Then remove 8 exit fingers and 1 actuator.

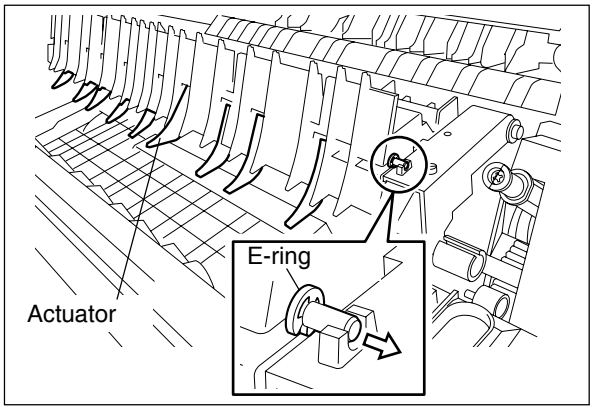


Fig. 16-740

16

(8) Remove 1 screw.

(9) Enlarge the frame and take off the transport guide.

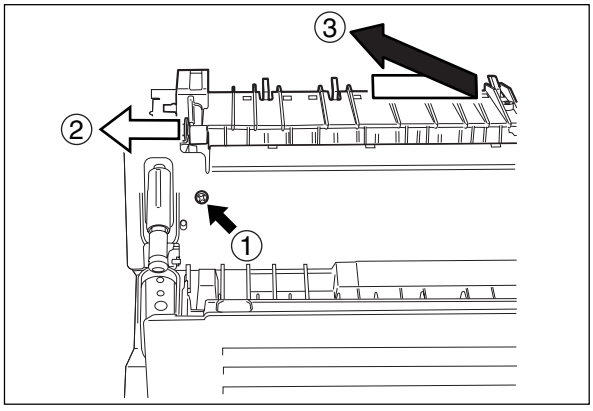


Fig. 16-741

[L] Exit roller

(1) Take off the fuser unit (► Chapter 16.7 [A]).

(2) Open the jam access cover of the fuser unit.

(3) Remove 2 screws (one of the front side is a shoulder screw) and take off the exit roller cover.

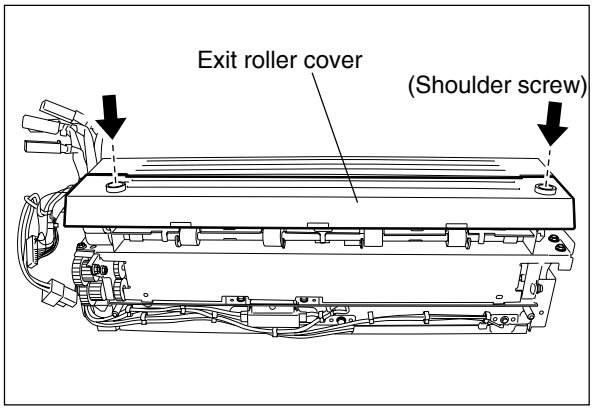


Fig. 16-742

(4) Remove 1 E-ring and 1 bushing from the exit roller front side.

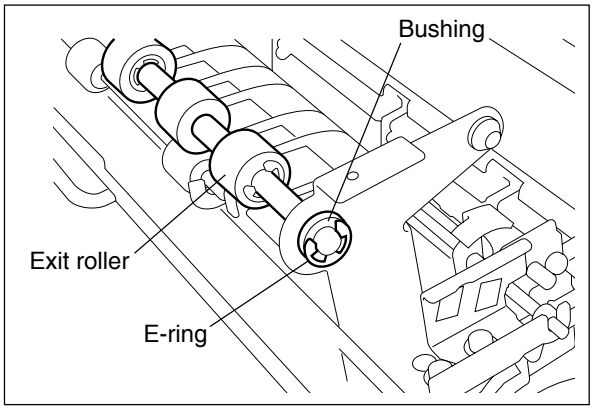


Fig. 16-743

(5) Remove E-ring, gear unit, E-ring and bushing in order from the exit roller rear side. Then take off the exit roller.

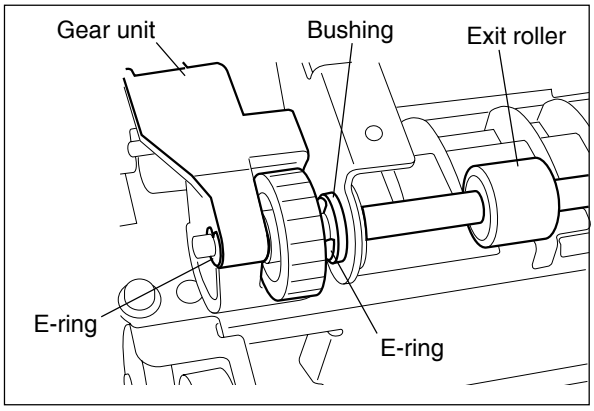


Fig. 16-744

[M] IH control PC board (IH board)

(1) Take off the SYS board case (► Chapter 2.5.2 [C]).
(2) Take off the flywheel (► Chapter 9.5 [A]).
(3) Take off the right rear cover (► Chapter 2.5.1 [L]).
(4) Disconnect 2 connectors and 4 faston terminal (► Chapter 16.7 [A]).
(5) Remove 3 screws and take off the IH board cover.
(6) Disconnect 2 connectors, remove 2 screws and take off the IH board case.

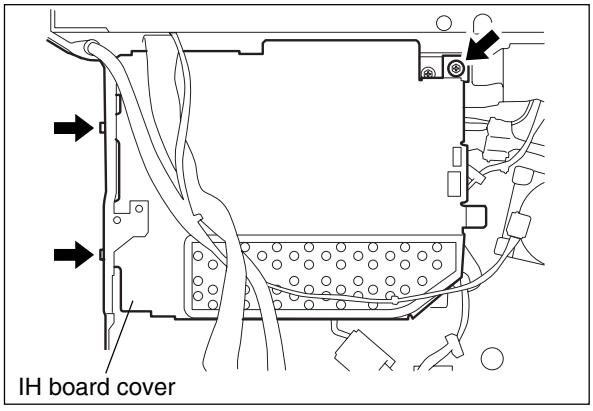


Fig. 16-745

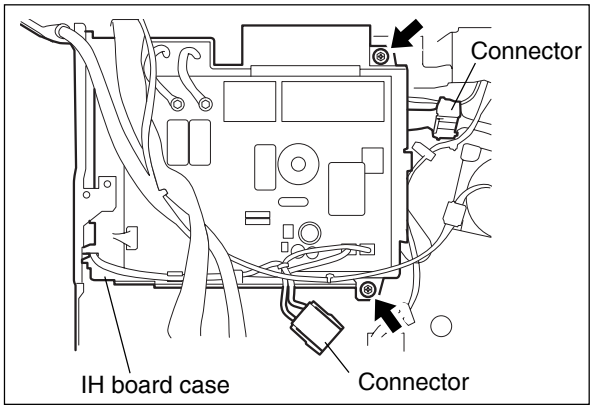


Fig. 16-746

(7) Disconnect 4 connectors, remove 7 screws and take off the IH board.

Notes: 1. Make sure not to connect each IH connection cable to the wrong position.
2. Tighten 4 screws of the IH connection cable completely (tightening torque: 1.17 - 1.56 N·m).
3. Since the IH control board is a high-voltage section, make sure to disconnect the power cable at maintenance.

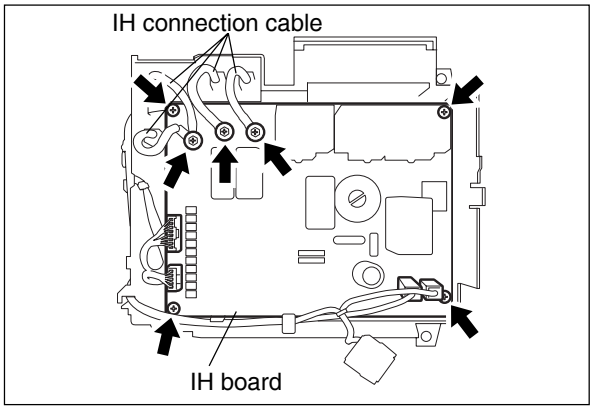


Fig. 16-747

[N] IH control board cooling fan

(1) Take off the IH board case (► Chapter 16.7 [M]).
(2) Remove 1 screw and take off the IH control board cooling fan cover.

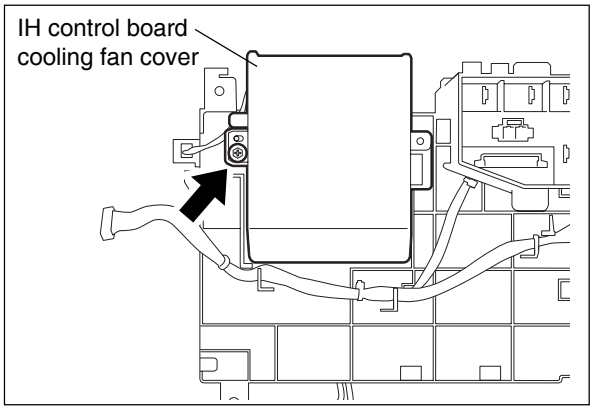


Fig. 16-748

(3) Disconnect 1 connector and take off the IH control board cooling fan.

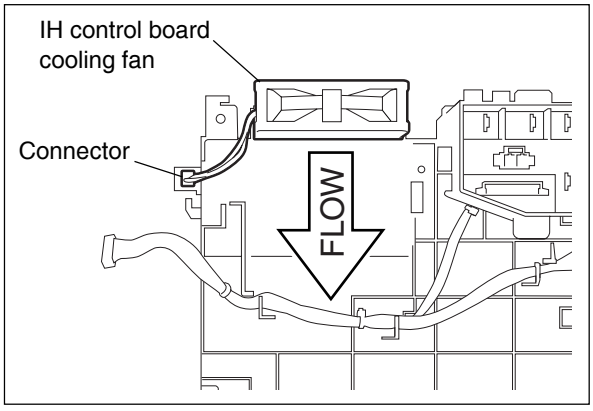


Fig. 16-749

[O] Scraper PM

(1) Take off the fuser unit (► Chapter 16.7 [A]).

(2) Remove 2 screws and take off the jam access cover.

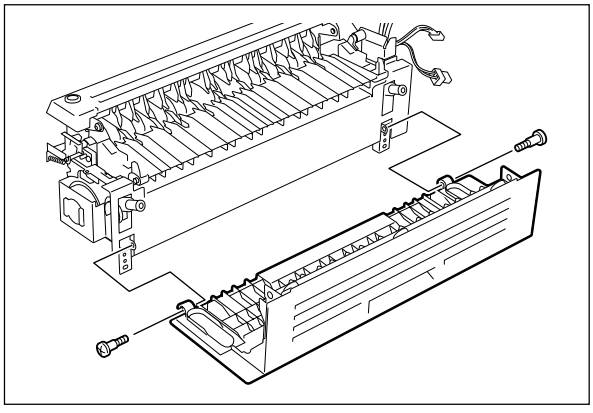


Fig. 16-750

(3) Remove 4 screws and take off the cover.

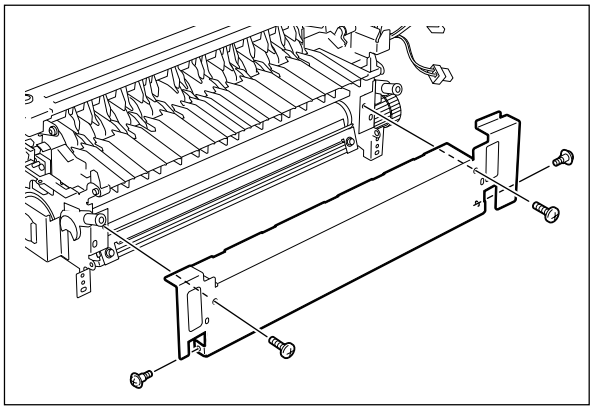


Fig. 16-751

(4) Remove 2 screws and take off the scraper.

Notes: 1. Before installing or taking off the scraper, confirm that the pressure releasing levers are up.

2. Be careful not to scratch the fuser belt.

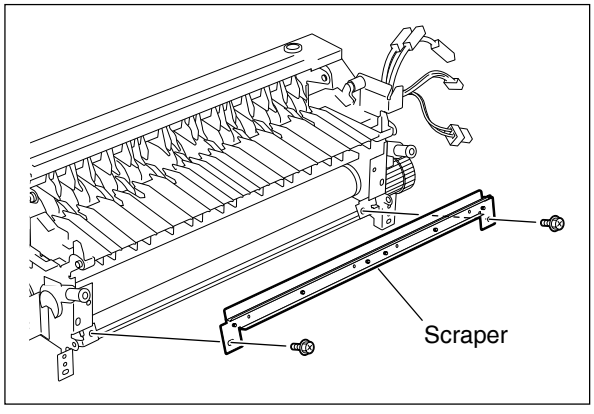


Fig. 16-752

17. AUTOMATIC DUPLEXING UNIT (ADU)

17.1 General Description

The Automatic Duplexing Unit (ADU) is a unit to automatically print on both sides of paper. A switchback method using the exit roller is adopted for the ADU of this equipment.

A sheet of paper is switchbacked by the exit roller right after the printing operation (fusing operation) on one side is completed, and the reversed sheet is transported to the registration section for the other side of the sheet to be printed.

The ADU mainly consists of the transport rollers and their drive system, paper guide and ADU entrance/ exit sensor.

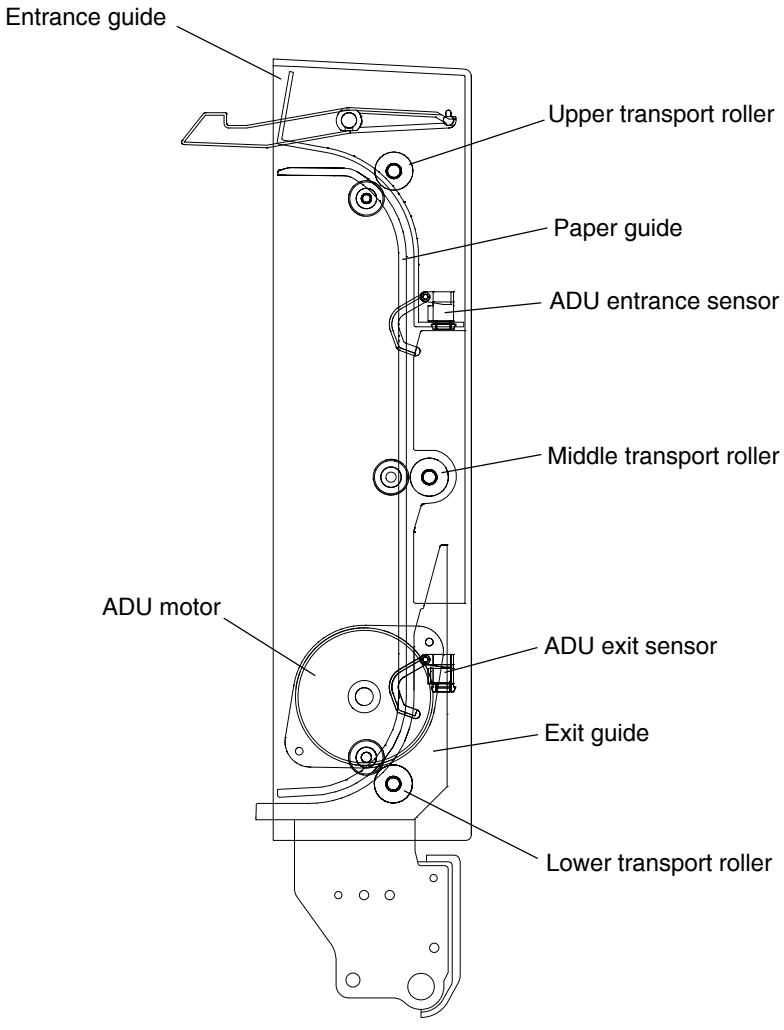


Fig. 17-101

17.2 Description of Operations

The back side printing (recording data of the back side of paper) is performed first by selecting duplex printing mode and pressing the [START] button. When the trailing edge of the paper passes the exit gate, the paper is switchbacked by the exit roller and transported into the ADU (the exit gate is closed with its own weight), and then the switchbacked paper is transported with acceleration. The transportation decelerates in front of the upper transport roller of the ADU. The front side printing (recording data of the front side of paper) is performed at the registration section. The paper passes through the exit gate again and is transported to the receiving tray to complete duplex printing.

There are three methods of judging a paper jam: (1) whether the ADU entrance sensor is turned ON or not in a specified period of time after the switchback to the ADU started (E510). (2) whether the ADU exit sensor is turned ON or not in a specified period of time after the ADU entrance sensor is turned ON (E520). (3) whether the registration switch is turned ON or not in a specified period of time after the paper feeding from the ADU to the equipment (E110).

If the ADU is opened during duplex printing, the ADU motor and ADU clutch are stopped, namely, ADU open jam occurs (E430).

The equipment is never to be stopped during printing by interruption in any case except paper jam or service call.

The operation of the duplex printing differs depending on the size of the paper; single-paper circulation and alternateness circulation. The figures in the following pages show the circulating operations during duplex copying. The numbers in the figures indicate the page numbers.

(a) Single-paper circulation

With the paper larger than A4/LT size, duplex printing (back-side printing → front-side printing) is performed for one sheet at a time as shown below.

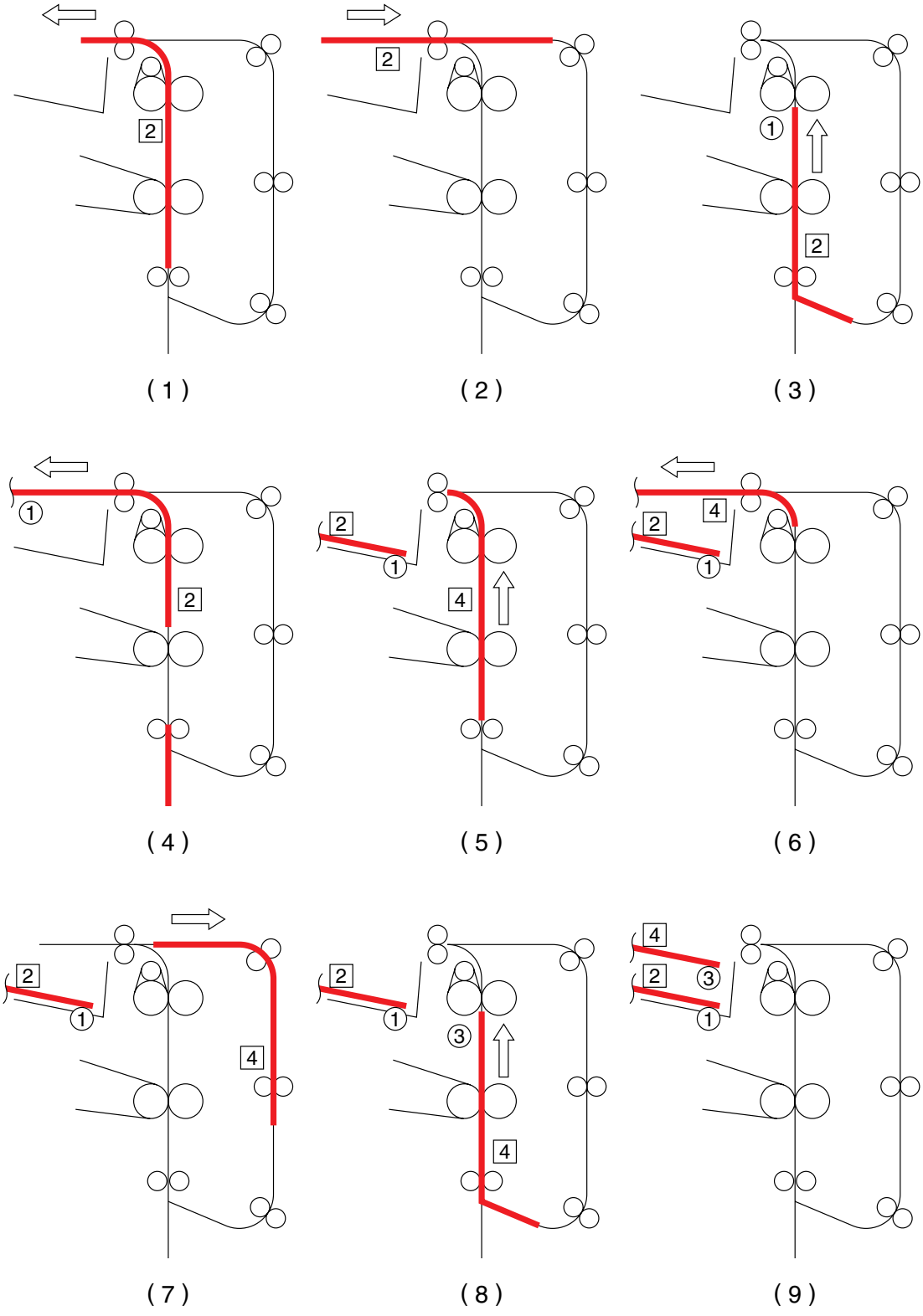
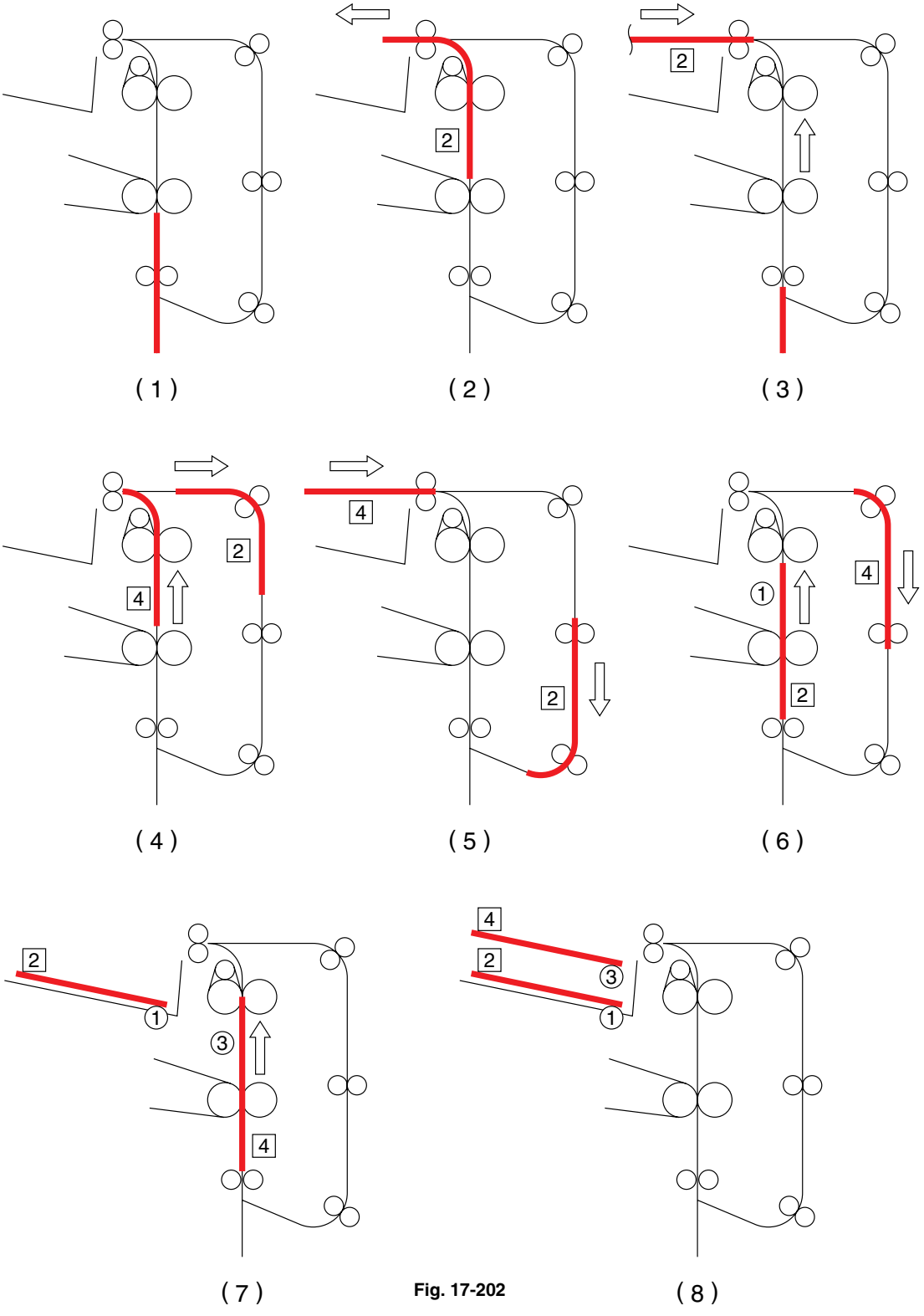


Fig. 17-201

(b) Double-paper alternateness circulation

With A4/LT size paper or smaller, duplex printing is performed for two sheets at a time as shown below.

Back side of the 1st sheet → Back side of the 2nd sheet → Front side of the 1st sheet → Front side of the 2nd sheet



(1) (2) (3)

(4) (5) (6)

(7) (8)

Fig. 17-202

(c) Multiple-paper circulation

With more than one sheet of A4/LT size paper or smaller, duplex printing is performed as shown below in a following order:

(In case of 5 sheets)

Back side of the 1st sheet ([2]) → Back side of the 2nd sheet ([4]) → Front side of the 1st sheet (①) → Back side of the 3rd sheet ([6]) → Front side of the 2nd sheet (③) → Back side of the 4th sheet ([8]) → Front side of the 3rd sheet (⑤) → Back side of the 5th sheet ([10]) → Front side of the 4th sheet (⑦) → Front side of the 5th sheet (⑨)

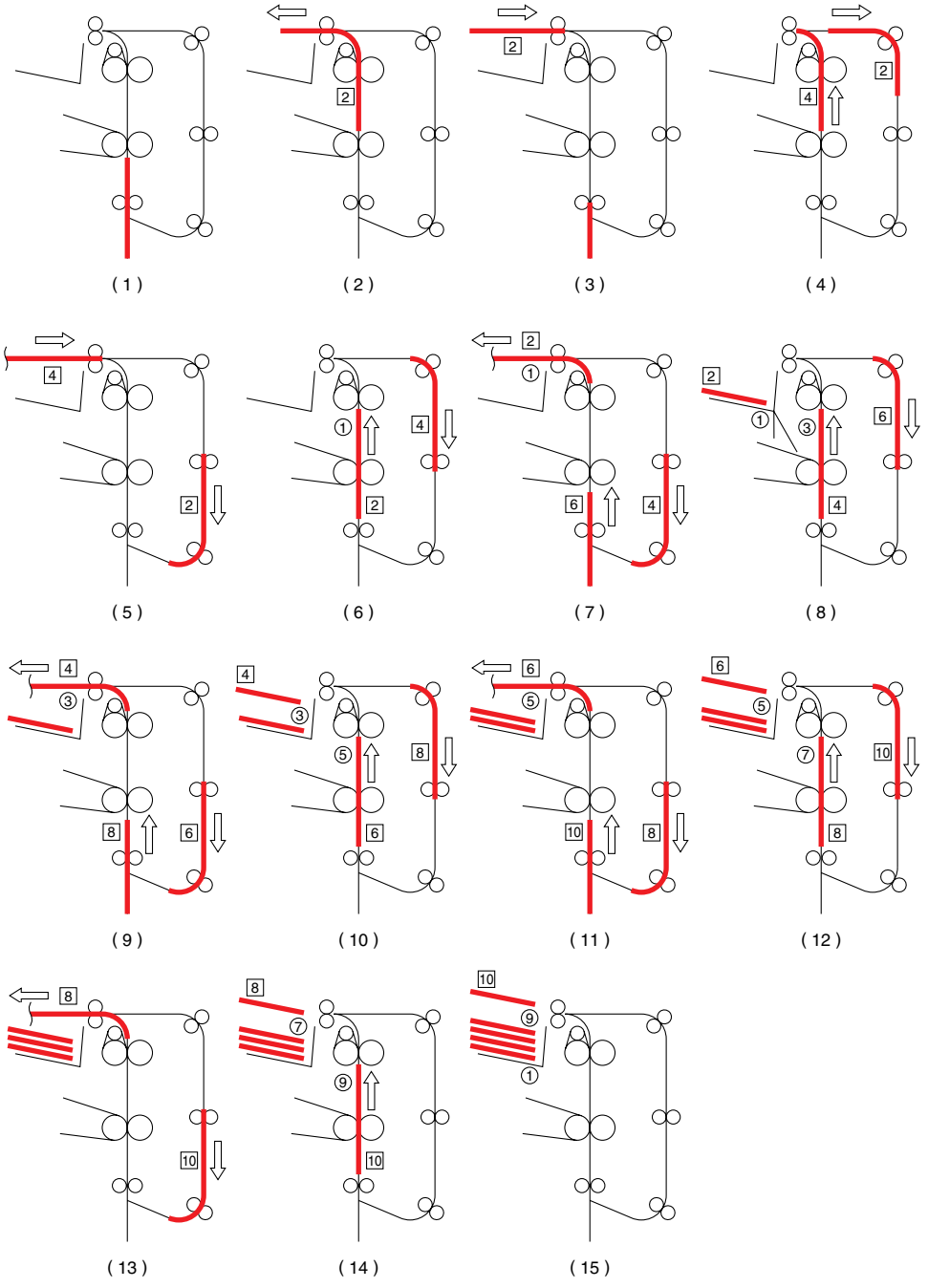
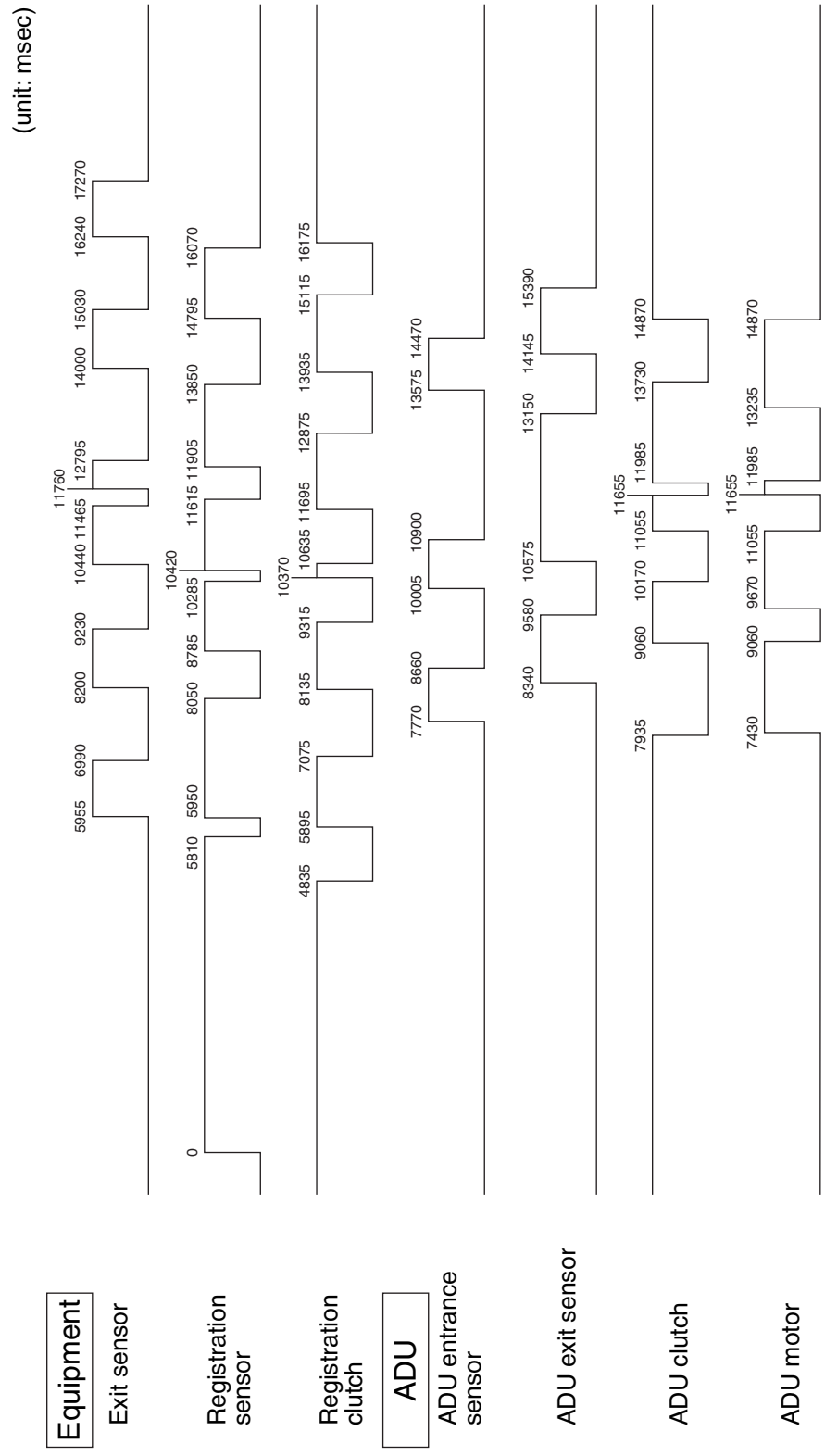
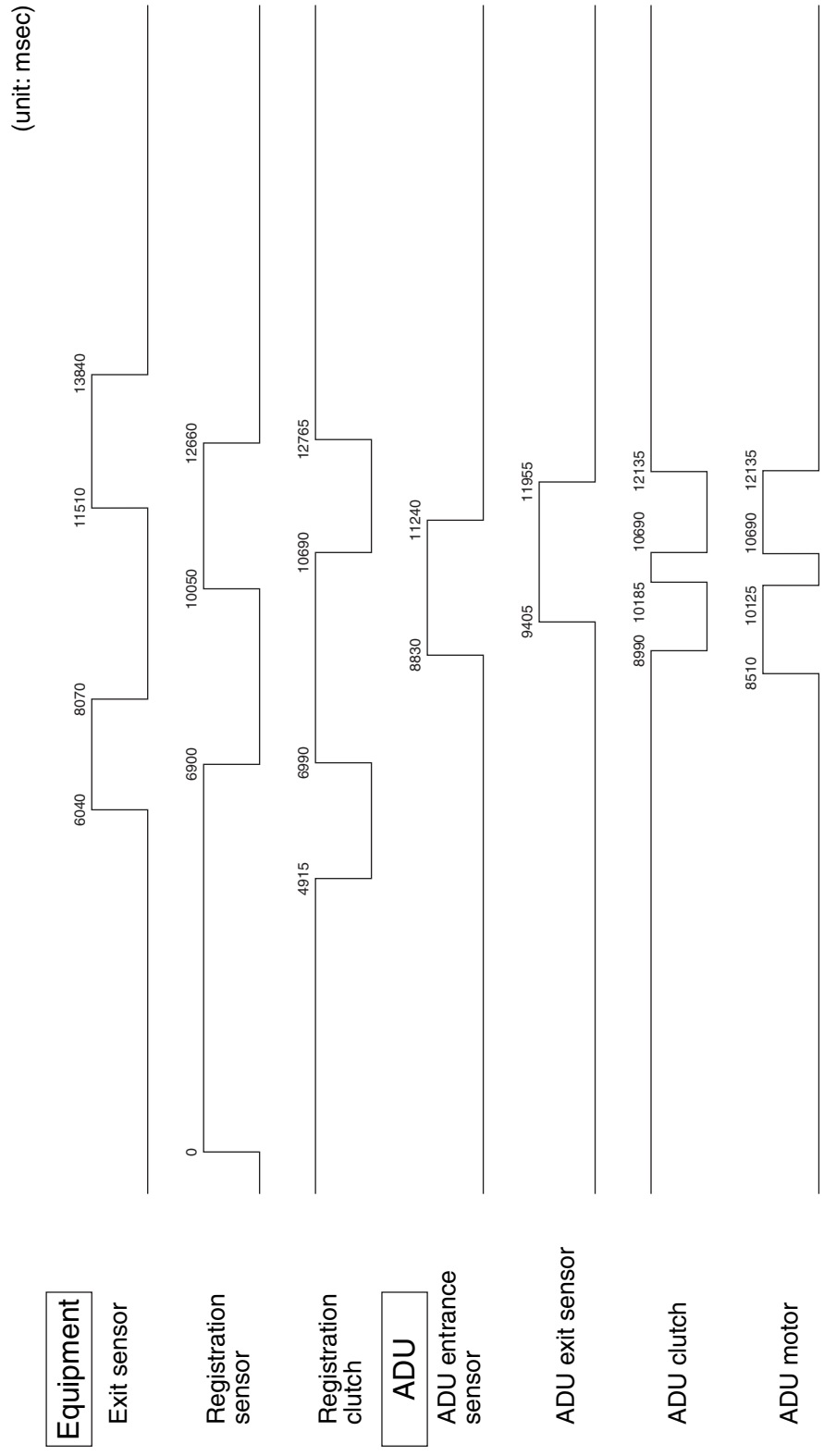


Fig. 17-203

Timing chart for duplex copying from upper drawer (A4, 3 sheets)



Timing chart for duplex copying from upper drawer (A3, 1 sheet)



17.3 Drive of ADU

When the ADU motor rotates to the direction A, the upper transport roller is rotated driven by the gears and belt. The ADU clutch is then turned ON and the middle transport roller and lower transport roller are rotated.

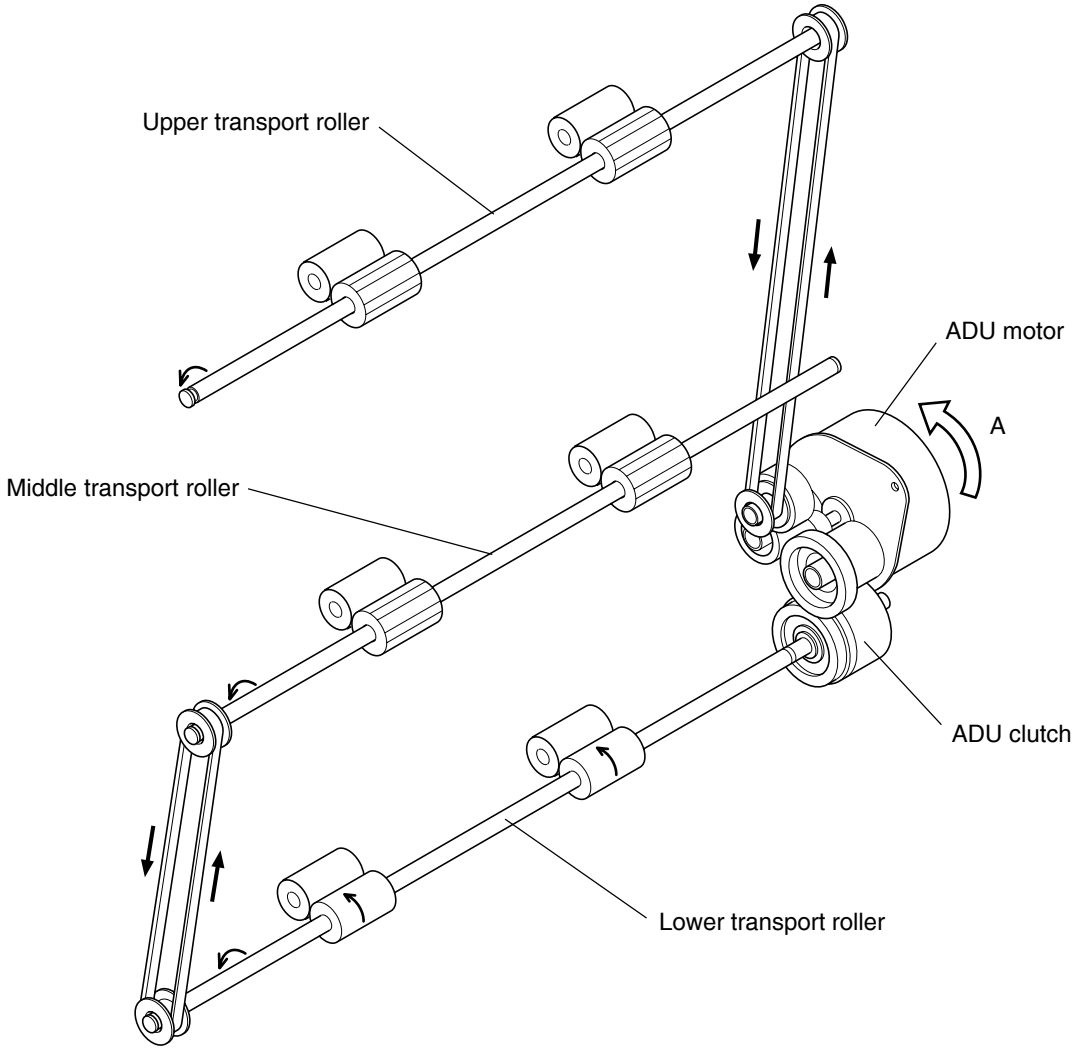


Fig. 17-301

17.4 Flow Chart

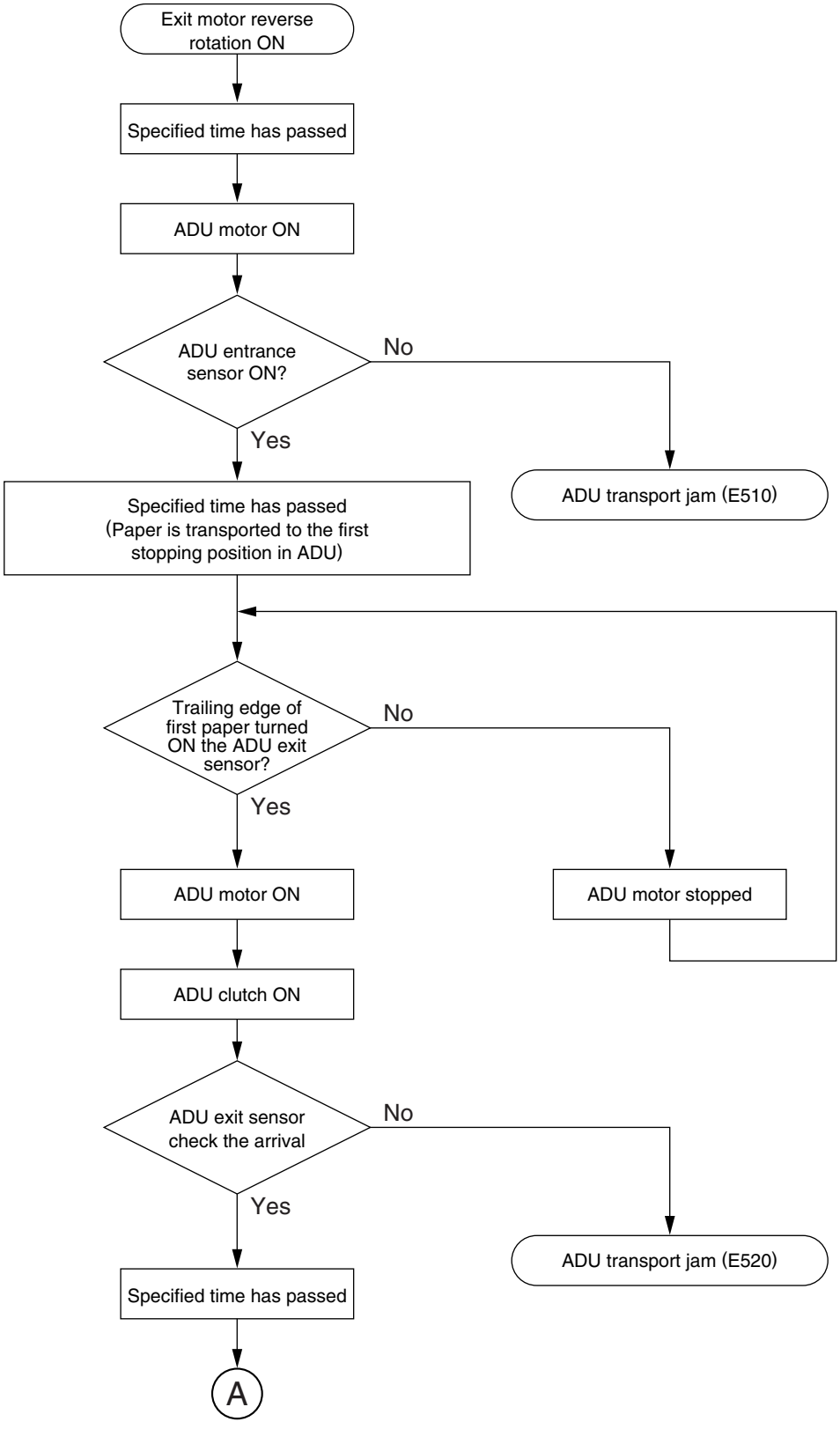


Fig. 17-401

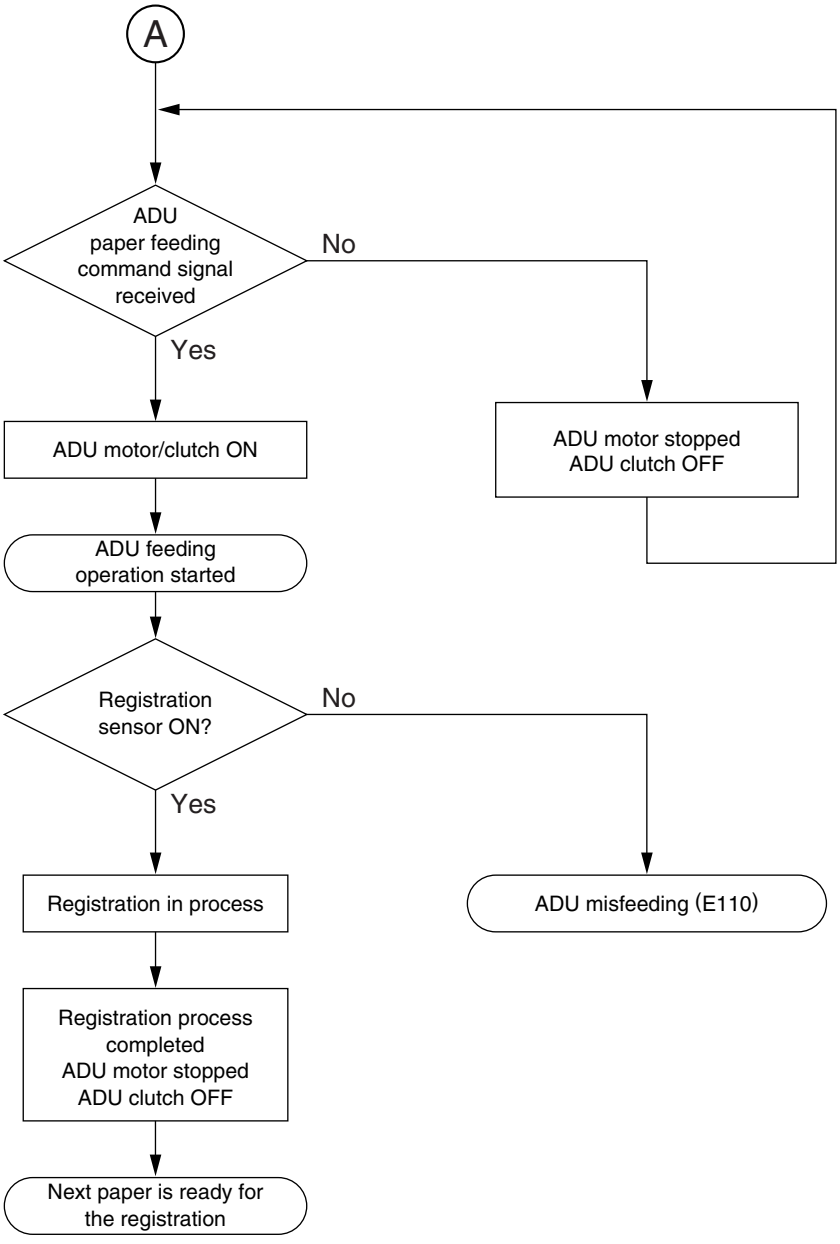

A
ADU
paper feeding
command signal
received
No
Yes
ADU motor/clutch ON
ADU motor stopped
ADU clutch OFF
ADU feeding
operation started
Registration
sensor ON?
No
Yes
Registration in process
ADU misfeeding (E110)
Registration process
completed
ADU motor stopped
ADU clutch OFF
Next paper is ready for
the registration

Fig. 17-402

18. POWER SUPPLY UNIT

18.1 Construction

The power supply unit consists of an AC filter and insulation type DC output circuits.

(1) AC filter

Eliminates noise from the outside and prevents the noise generated by the equipment from leaking to the outside.

(2) DC output circuits

Converts AC voltage input from outside to DC voltage and supplies it to each electric part. The DC voltage is divided into the following two lines.

a. Main line : Power supply used in the entire equipment during image forming process. Four kinds of voltage (+3.3V, +5.1V, +12V and –12V) are output when the main switch of the equipment is turned ON.

b. Door switch line : Power supply used in the entire equipment during image forming process, being supplied via the door switch. Two kinds of voltage (+5.1VD and +24VD) are output only when the main switch of the equipment is turned ON and two doors (front cover and jam access cover) are closed.

18.2 Operation of DC Output Circuits

(1) Starting line output

When the main switch of the equipment is turned ON, power starts supplying to all the lines only when two doors (front cover and jam access cover) are closed.

(2) Stopping line output

When the main switch of the equipment is turned OFF, PWR-DN signal is output after the instantaneous outage insurance time (20 ms or more) elapses and then the supply of each voltage stops. If the supply of voltage of the main line (+3.3VA, +5.1VA, +12VA, -12VA) stops earlier than the 24V line does, it may cause the damage of the electron device on each control circuit. To prevent this, the supply of these voltages stops after the PWR-DN signal is output and the minimum retaining time (+3.3VA/+5.1VA: 50 ms or more, +12VA/-12VA: 5 ms or more) elapses.

(3) Output protection

Each output system includes an overcurrent and overvoltage protection circuits (a fuse and internal protection circuit). This is to prevent the defectives (damage or abnormal operation of the secondary circuit) which may be caused by an overcurrent due to a short circuit or an overvoltage due to a short circuit between different voltages. If the protection circuit is activated (except the case the fuse is blown out), remove the causes such as short-circuit. Turn ON the power again 1 minute later to clear the over-current protection.

18.3 Output Channel

The followings are four output channels which are not linked with the door switch.

(1) +3.3V

+3.3VA : CN464 Pins 13, 14, 15 and 16
Output to the SYS board

+3.3VB : CN464 Pins 19 and 20
Output to the SYS board

+3.3VB : CN466 Pin 3
Output to the LGC board

+3.3VB : CN467 Pins 17 and 18
Output to the SLG board

(2) +5.1V

+5.1VA : CN464 Pins 24 and 26
Output to the SYS board

+5.1VB : CN464 Pin 25
Output to the SYS board

+5.1VB : CN466 Pin 1
Output to the LGC board, CCL board (via LGC board), PFP/LCF (via LGC board), Bridge unit (via LGC board)

+5.1VB : CN467 Pins 5 and 6
Output to the RADF

+5.1VB : CN467 Pins 21 and 22
Output to the SLG board

+5.1VB : CN468 Pin 1
Output to the finisher

+5.1VB : CN469 Pin 5
Output to the FIL board or FUS board

(3) +12V

+12VA : CN464 Pin 7
Output to the SYS board

+12VB : CN464 Pin 5
Output to the SYS board

+12VB : CN466 Pin 16 (*NAD/SAD/TWD models only)
Output to the LGC board

(4) -12V

-12VA : CN464 Pin 9
Output to the SYS board

-12VB : CN464 Pin 3
Output to the SYS board

The followings are two output channels which are linked with the door switch.

(1) +5.1V

+5.1VD : CN466 Pins 11 and 12
Output to the LGC board

(2) +24V

+24VD1 : CN465 Pins 1 and 2
Output to the LGC board, CCL board (via LGC board), Bridge unit (via LGC board)

+24VD1 : CN469 Pins 1 and 2
Output to the PFP/LCF

+24VD1 : CN470 Pin 1
Output to the power supply cooling fan

+24VD2 : CN465 Pins 5 and 6
Output to the DRV board

+24VD3 : CN467 Pins 1 and 2
Output to the RADF

+24VD4 : CN467 Pin 9
Output to the SDV board

+24VD4 : CN467 Pins 11 and 13
Output to the SLG board

+24VD5 : CN468 Pin 3
Output to the finisher

<<Output connector>>

Not linked with the door switch

CN464	For the SYS board
CN466	For the LGC board, FAX board, CCL board (via LGC board), PFP/LCF (via LGC board), Bridge unit (via LGC board)
CN467	For the SLG board, RADF
CN468	For the finisher
CN469	For the FIL board / FUS board

Linked with the door switch

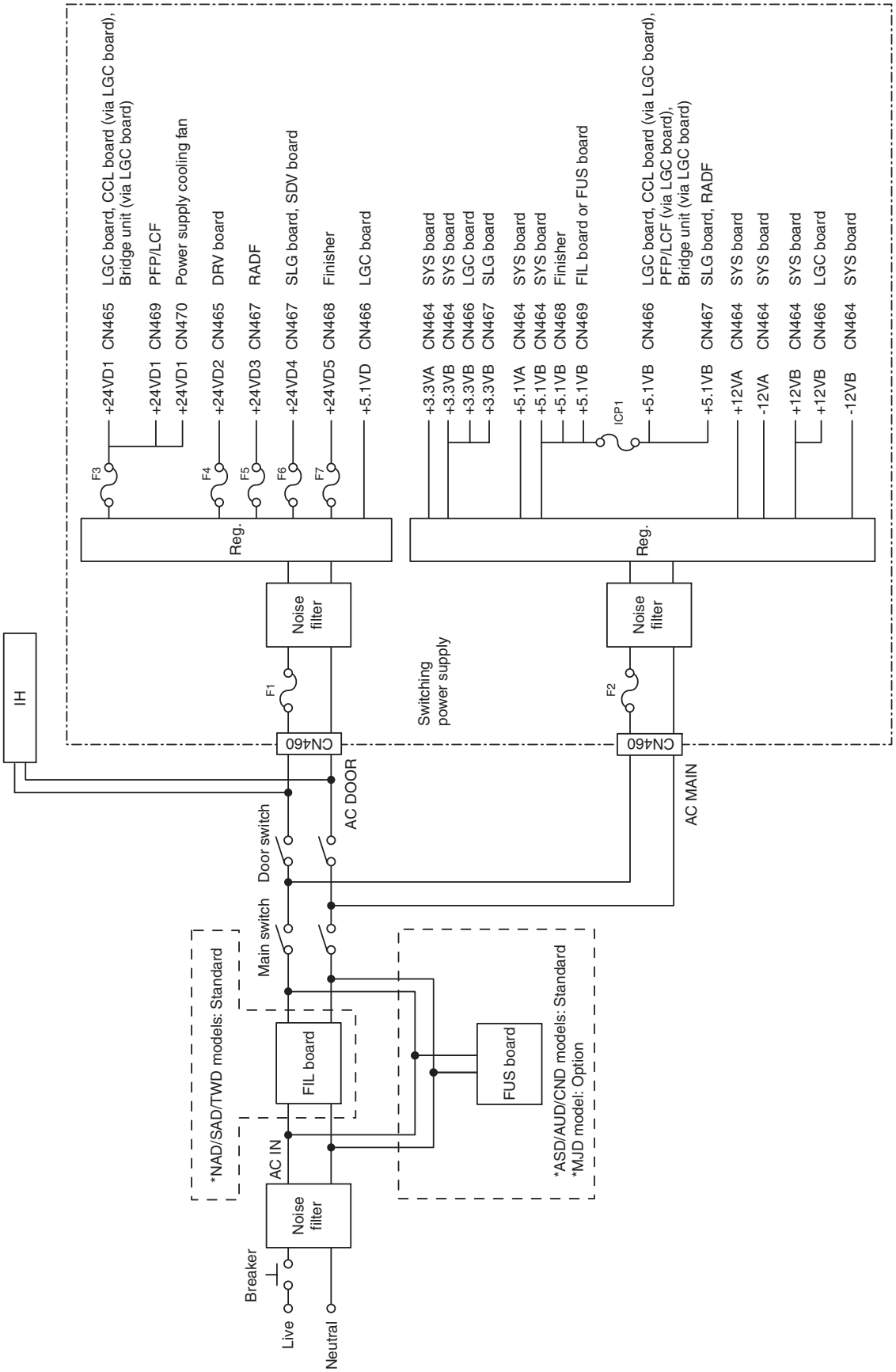
CN465	For the LGC board, DRV board, CCL board (via LGC board), Bridge unit (via LGC board)
CN466	For the LGC board
CN467	For the SLG board, SDV board, RADF
CN468	For the finisher
CN469	For the PFP/LCF
CN470	For the power supply cooling fan

18.4 Fuse

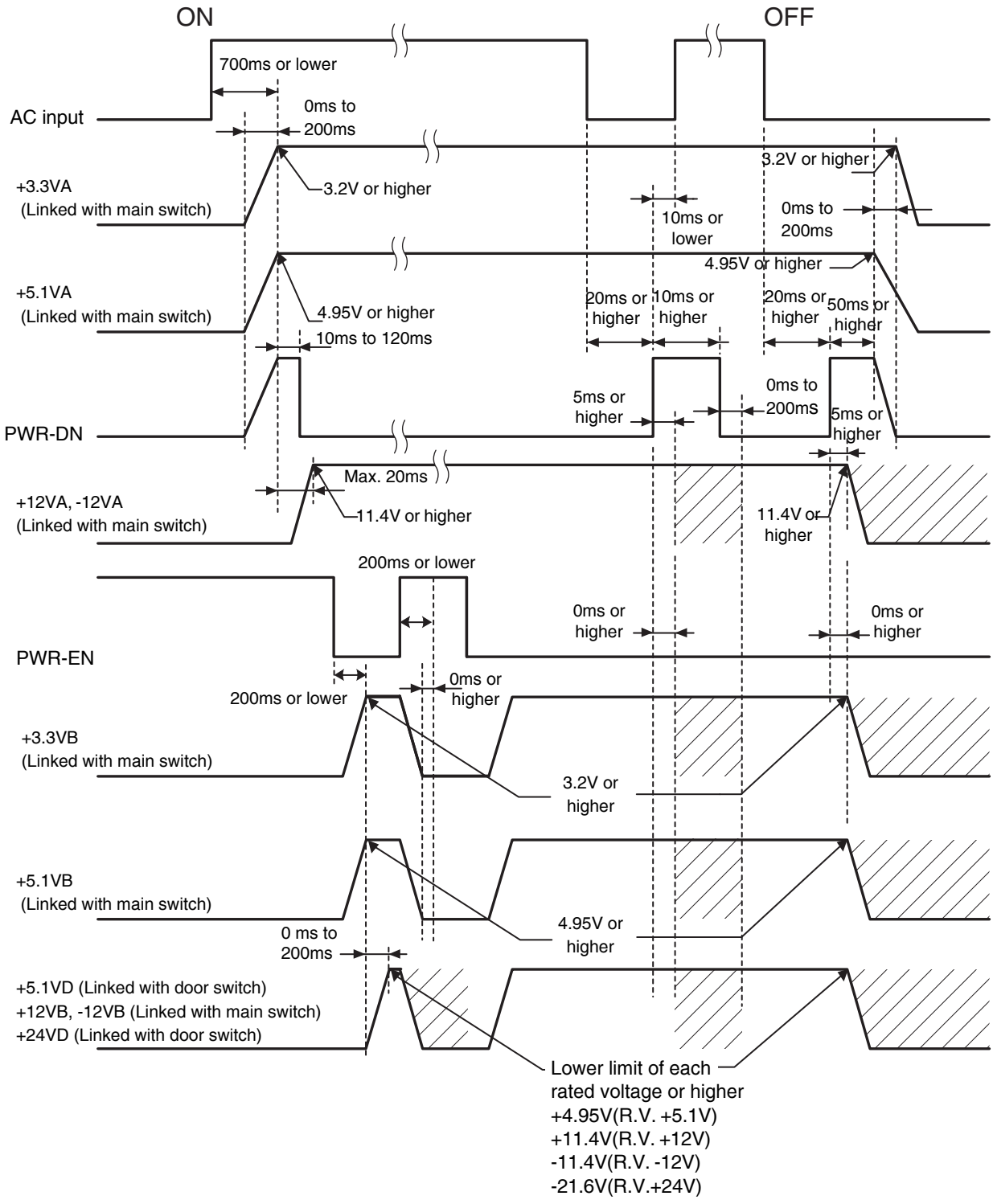
When the power supply secondary fuse is blown out, confirm that there is no abnormally with each part using the following table.

Voltage	Board/Unit	Part	Fuse type
+24VD1	LGC	Polygonal motor	F3:8A (Semi time-lag)
		Tray-up motor	
		ADU motor	
		Main motor	
		Developer motor	
		Transport motor	
		Drum cleaner brush motor	
		Transfer belt cleaner auger motor	
		Toner motor	
		Laser unit cooling fan	
		2nd transfer roller contact clutch	
		Bypass feed clutch	
		Registration clutch	
		Upper transport clutch (high speed)	
		Upper transport clutch (low speed)	
		Lower transport clutch (high speed)	
		Lower transport clutch (low speed)	
		Upper drawer feed clutch	
		Lower drawer feed clutch	
		ADU clutch	
		Color developer toner supply clutch	
		Color developer drive clutch	
		Black developer drive clutch	
		Black developer lifting clutch	
		Transfer belt cleaner contact clutch	
		Bypass pickup solenoid	
		Image quality sensor shutter solenoid	
		Color auto-toner sensor shutter solenoid	
		Discharge LED	
		Key copy counter / Copy key card	
	CCL	Charger cleaner motor	
	Power supply	Power supply cooling fan	
	PFP/LCF		
	Bridge unit		
+24VD2	DRV	Revolver motor	F4:5A (Semi time-lag)
		Exit motor	
		IH control board cooling fan	
		Ozone exhaust fan	
		Internal cooling fan	
+24VD3	RADF		F5:4A (Semi time-lag)
+24VD4	SLG	Exposure lamp (lamp inverter)	F6:4A (Semi time-lag)
		CCD drive circuit (CCD board)	
		SLG board cooling fan	
		Scanner unit cooling fan	
	SDV	Scan motor	
+24VD5	Finisher		F7:5A (Semi time-lag)

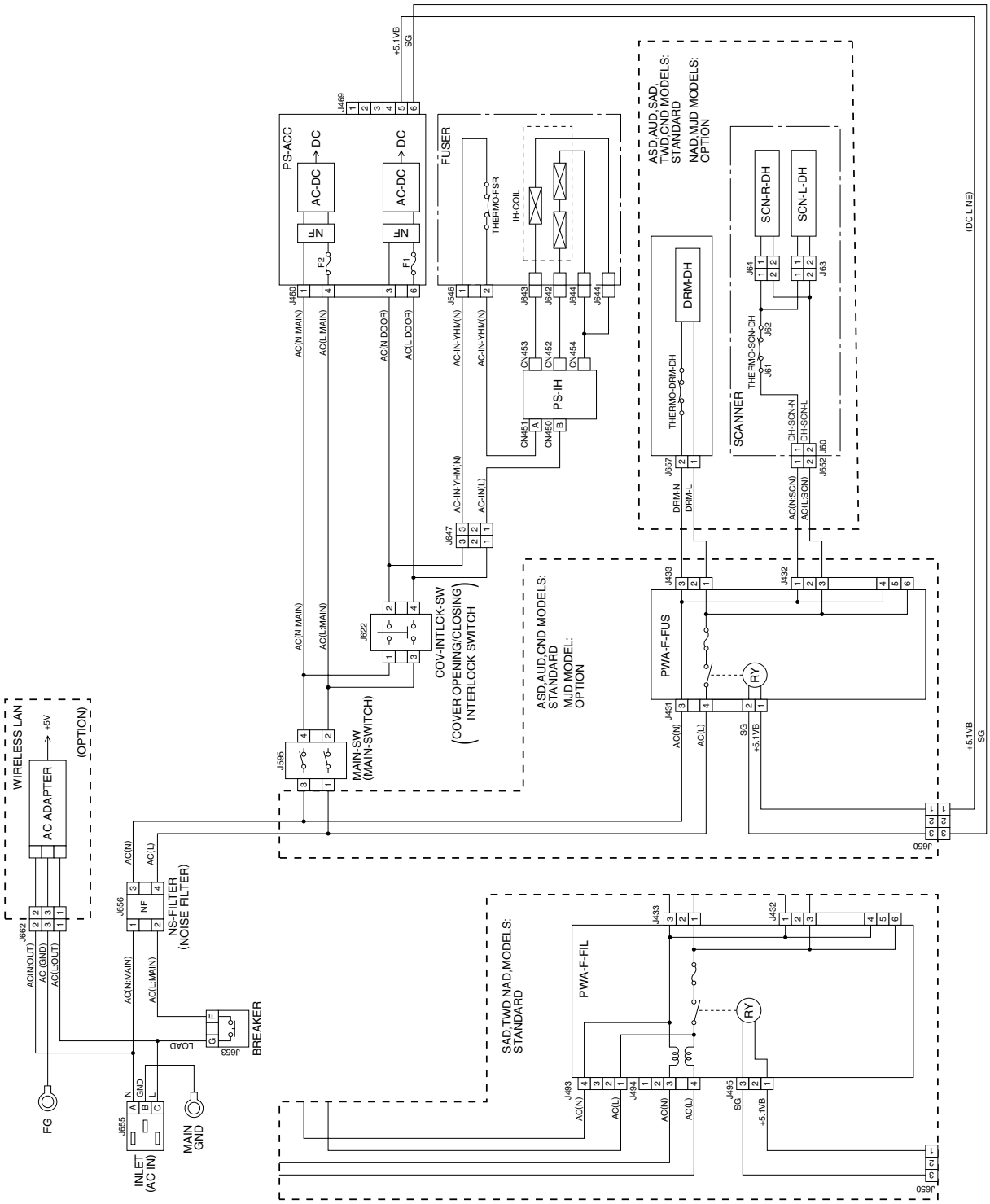
18.5 Configuration of Power Supply Unit



18.6 Sequence of Power Supply

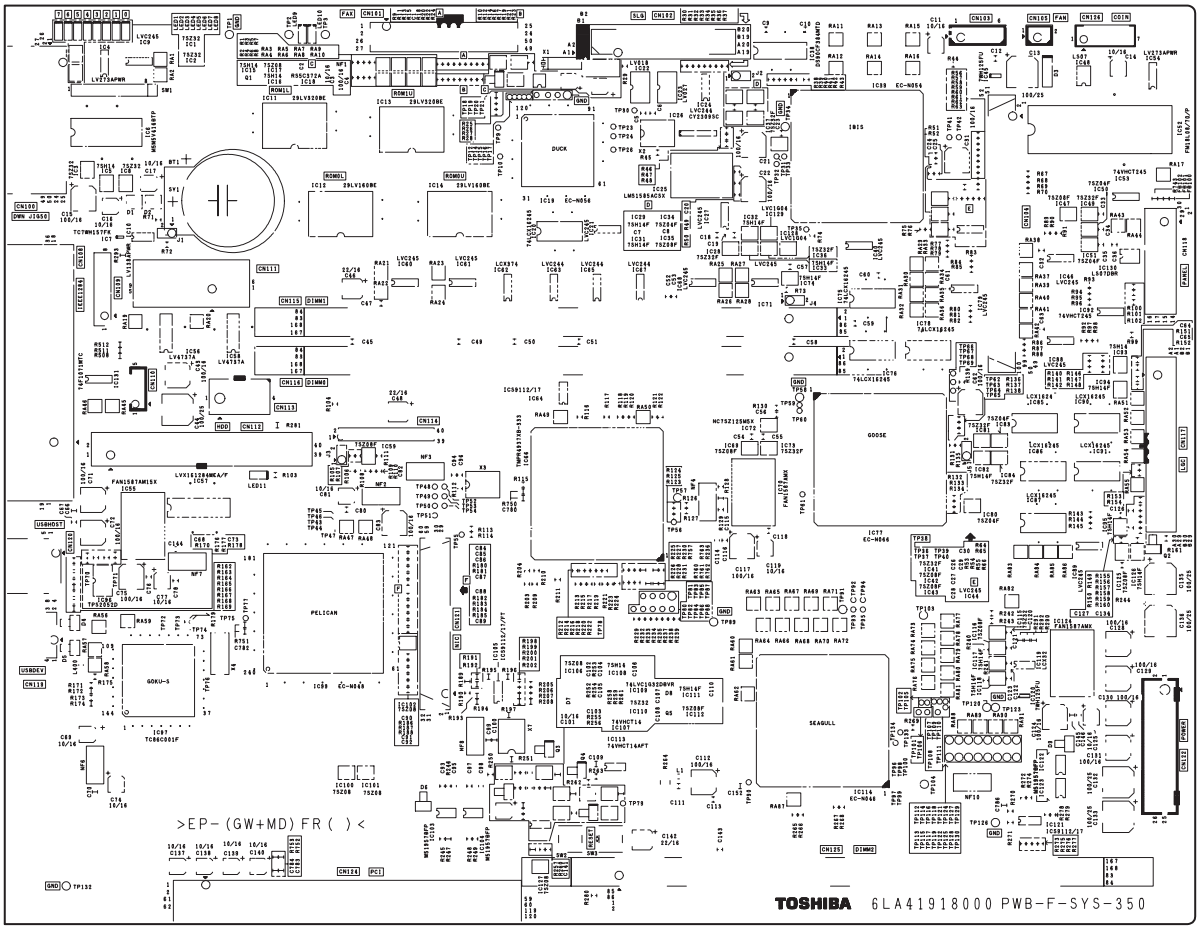


18.7 AC Wire Harness

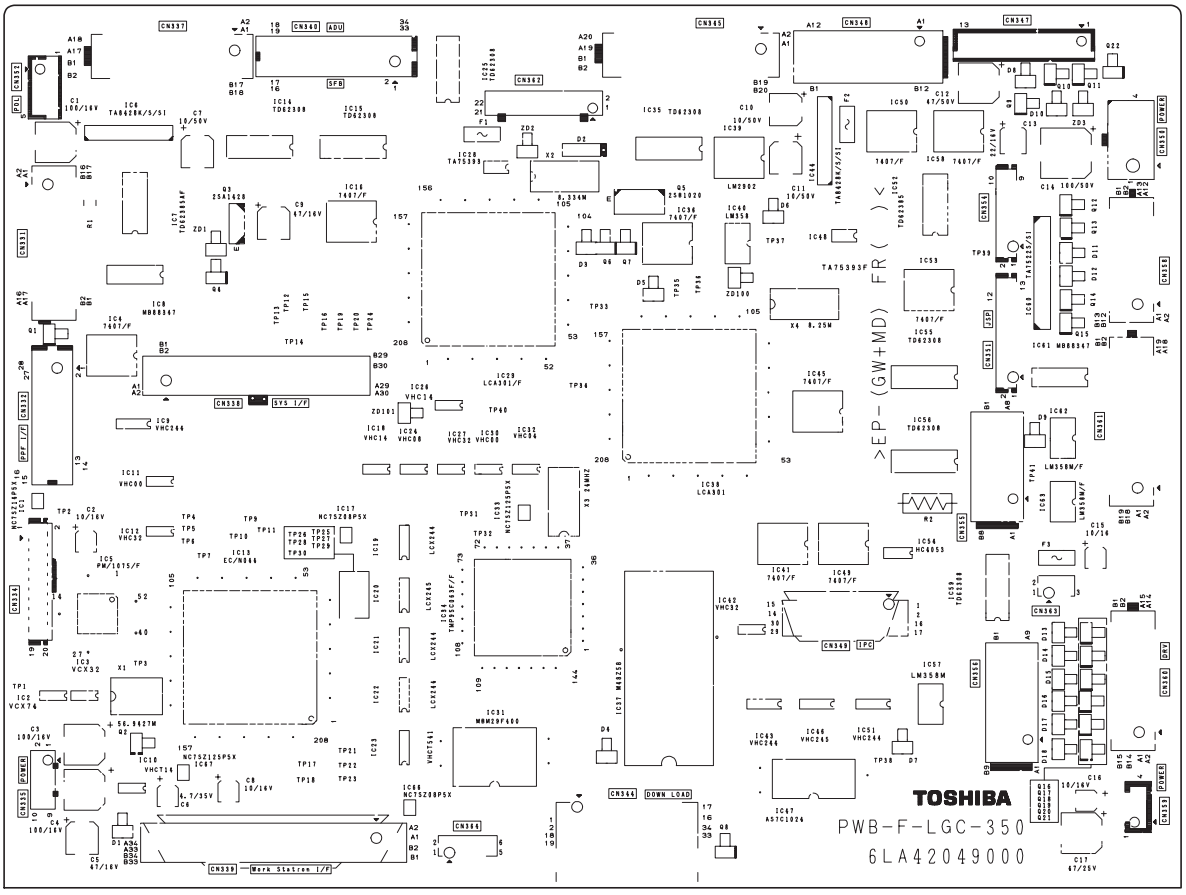


19. PC BOARDS

(1) PWA-F-SYS

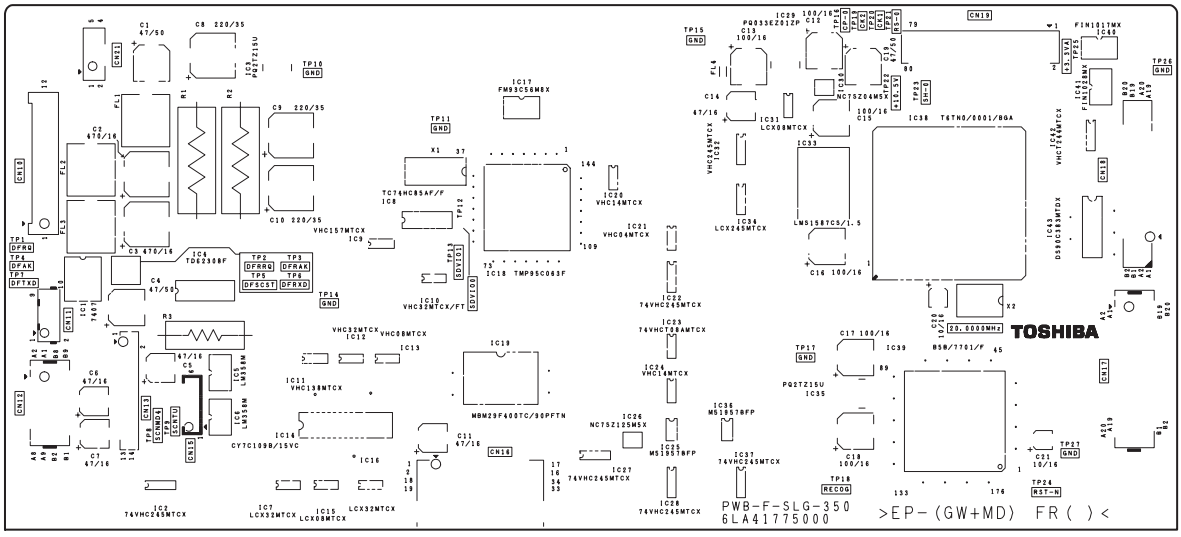


(2) PWA-F-LGC

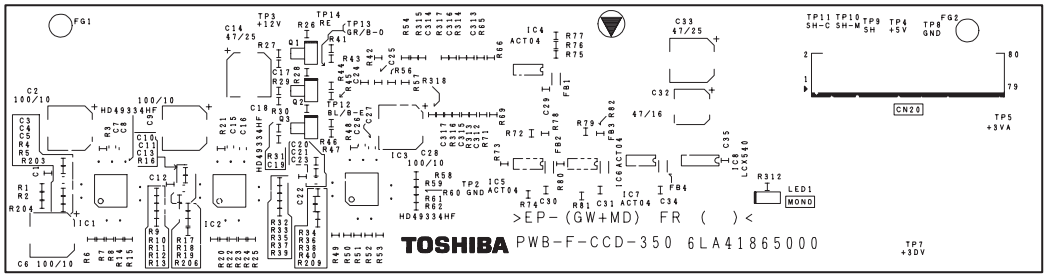


19

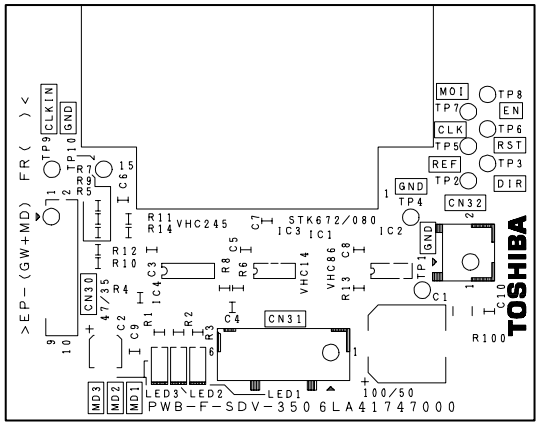
(3) PWA-F-SLG



(4) PWA-F-CCD



(5) PWA-F-SDV



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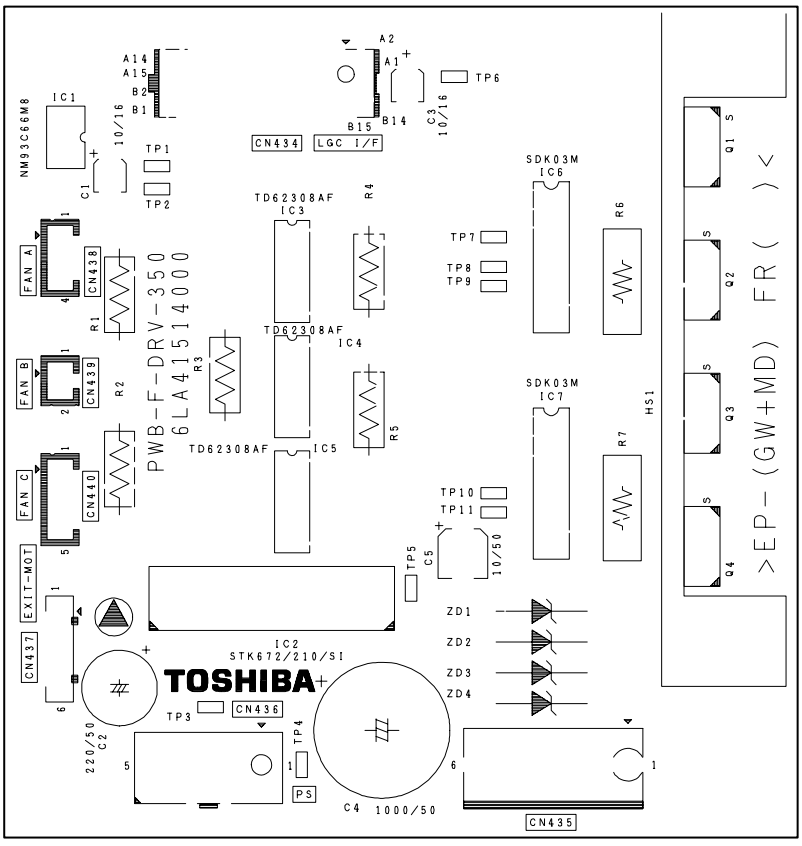
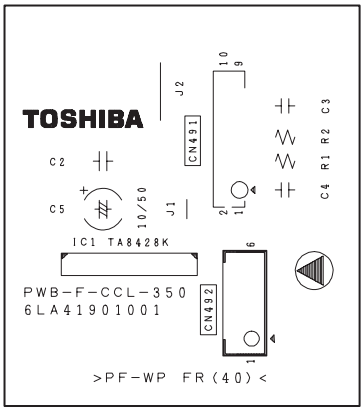
(6) PWA-F-DRV

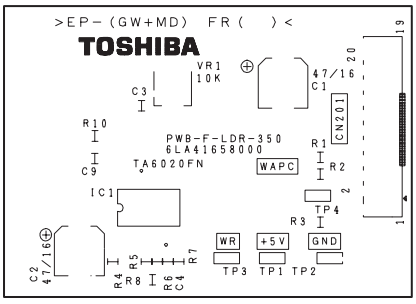


(7) PWA-F-CCL

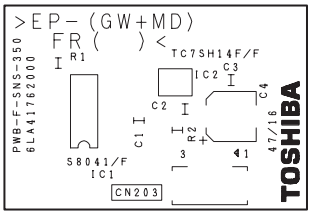


19

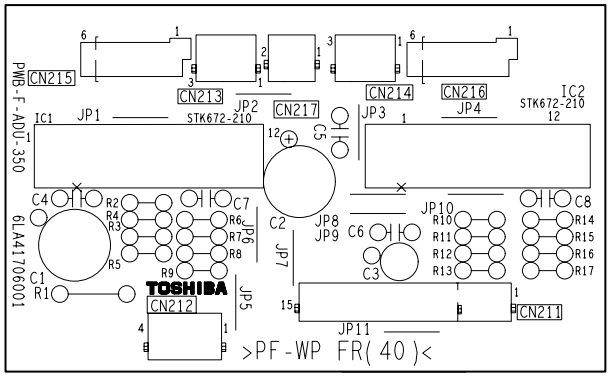
(8) PWA-F-LDR



(9) PWA-F-SNS



(10) PWA-F-ADU



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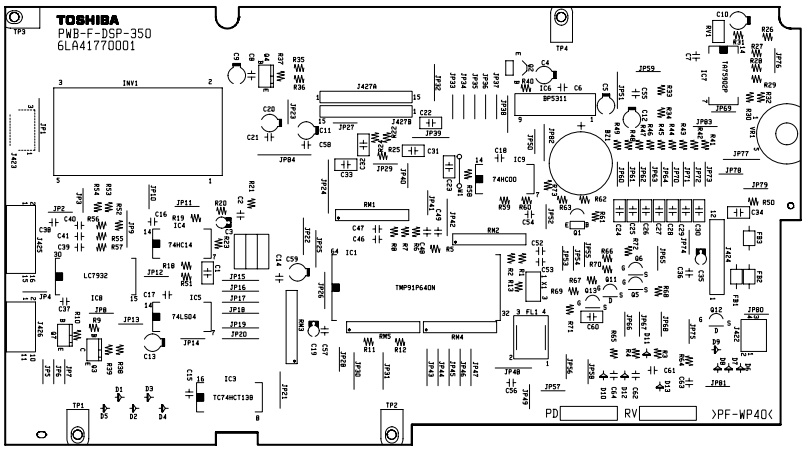
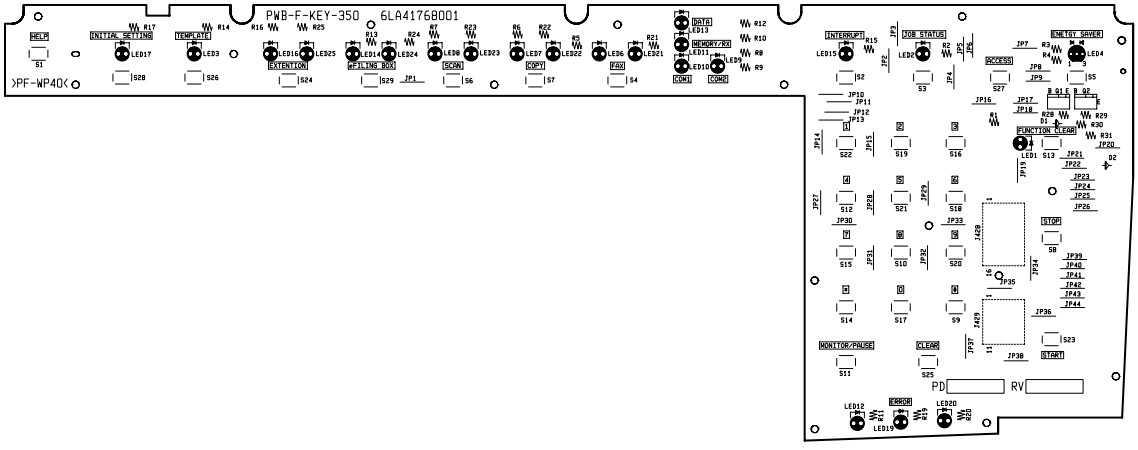
(11) PWA-F-DSP



(12) PWA-F-KEY



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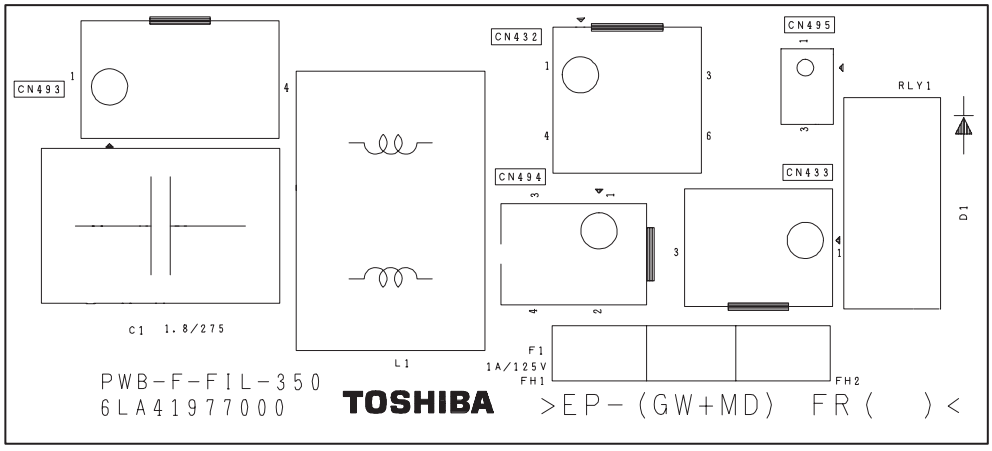
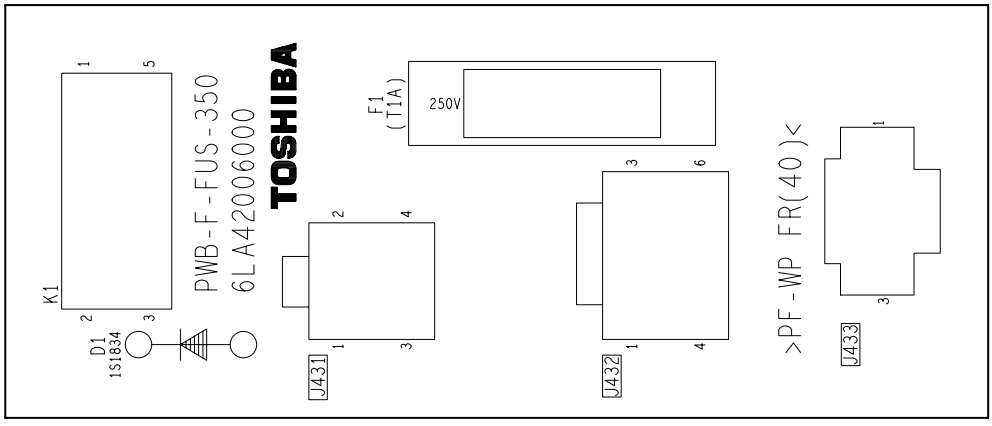
(13) PWA-F-FIL

(* NAD/SAD/TWD models: Standard)



(14) PWA-F-FUS

(* ASD/AUD/CND models: Standard, MJD model: Option)



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TOSHIBA

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